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ABSTRACT

This document consists of the six issues of the "Wilderness Medicine Newsletter" published during 1998. The newsletter provides medical and rescue information for the non-physician in remote wilderness areas. Issues typically include feature articles, conference and training courses schedules, and personal narratives. Feature articles in this volume cover avalanche awareness; advanced life support in the backcountry; a hypothermia treatment device for search and rescue teams called the charcoal vest; an overview of tick-borne diseases; an overview of insect repellents; a case discussion from a newsletter about mountain medicine; a review of heat illnesses; hyperventilation; using Global Positioning System units; keeping Wilderness First Responder certification current; an overview of trench foot; gender specific emergencies; and environmental problems and acute trauma associated with backcountry skiing. (TD)

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FOR THE RECOGNITION, TREATMENT, AND PREVENTION OF WILDERNESS EMERGENCIES

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AVALANCHE AWARENESS

A Blend of Humility and Attitude

By Chris Joosen, WEMT

**"'Extreme' avalanche danger?
Ah! Its all a matter of opinion!"**

The avalanche bulletin had been posted with its "Extreme" warning from the day before when we arrived at Hermit Lake at 7:20 am. It was a clear morning with light winds blowing from the west at 20-30 mph. The snowcat tracks squeaked to a halt as Marianne used the binoculars to get a better view of what looked like a 800 - 1000 ft fracture line. Liz, the AMC Tuckerman Ravine caretaker, walked out of her cabin to greet us. "Can you believe those guys!" belted from her lungs while she pointed toward the Sluice. Marianne passed the binoculars across the cab. I could see two guys walking around in mini circles on a stamped-out tent ledge 20 feet above the 5 foot deep crown line. Liz continued "I spoke to one of those guys last night and he assured me he was not illegally camped and was not in avalanche terrain— including **runout zones!"**

As we headed into the ravine, the severity of what these two hikers had done ran through my mind. It is difficult to believe that even someone with no avalanche awareness at all would hike into Tuckerman Ravine during a snow storm, acknowledge the "Extreme" avalanche bulletin, travel through numerous terrain traps, head up 38-44 degree slopes, punch through between the knee- and mid-thigh snow, set-up camp, and think there wasn't a problem. "OK, Chris," I said to myself, "forget about the illegal camping issue just this once. Make them understand how lucky they are to be alive! Education, Education, Education!" Marianne and I stood at the bottom of the ravine atop a debris pile the size of two football fields watching the two descend toward us. They were descending with ropes while down climbing using a system never before seen by humans. It was painful to watch their excruciatingly slow progress on a 40 degree slope. I figured they were either extremely shook up by the slide or very new to snow travel.

The fracture line was impressive, zigzagging across the bowl, up towards the Lip, down around the Sluice, and into Right gully, totaling about one thousand feet across. The crown varied from 2 to 6 feet. Over the last 36 hours the summit of Mt. Washington had received over 18 inches of fresh snow with winds peaking the night before at 123 mph from the west. I was looking forward to doing a fracture-line profile to examine the weak layer which caused the slope failure when the campers finally arrived. We greeted each other, commenting on the beautiful day as I segued into an avalanche awareness discussion. Using the utmost in diplomacy, I attempted to make them realize the extent of the errors they had made—in essence breaking every rule in the book. Although French-Canadian, they spoke English well, so language was not a barrier. But for some reason we were not communicating. Marianne and I began switching in and out of the discussion allowing the other to regroup and gather thoughts in an attempt to get the point across in a different way. I explained the mistakes a group of four French-Canadians had made six weeks before causing them to become avalanched, which killed one and injured another, just two thousand feet from where we stood. Over the fifteen minute discussion it was apparent that they had no avalanche awareness and had no interest in learning or listening to what we had to say. I pulled out all I had in my bag of tricks, reiterating most of what I had said the night before at an avalanche awareness talk I had given at SOLO. I was stumped. The more vocal of the two finally looked at me and said, "Ah!, It's all a matter of opinion." With that the two turned away and headed across the massive debris field they may or may not have caused..... I dropped to my butt in

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disbelief, sitting among the piles of debris the avalanche demons sent down in the night. I had failed. This is what I do, my life, my passion. I'm a professional ... right...? It was the winter of '96, with six fatalities— three by avalanche burials in the Mt. Washington area and 2 more fatal burials in eastern Canada, that finally turned the tide in my head. Education, Education, Education. I need to get to them before they arrive at my doorstep! More slide shows, more avalanche talks, more awareness courses. Assist interested groups in developing teaching curriculum... the list never ends.

The Bigger Picture: The Eastern Avalanche Forecaster

Through the past eight winters working in Tuckerman and Huntington Ravines, I have seen the above scenario occur over and over. This ignorance (or arrogance) has been something I have come to expect from day-to-day, but something I will never get accustomed to or accept. Over time, recognition of these attitudes sit like a pain in my stomach eagerly desiring a cure.

Being a Snow Ranger for the United States Forest Service has been an incredibly rewarding job. It truly allows me to make a positive difference in peoples lives while they are doing the things they love. The direct contact with individuals in the field while in uniform is something that can't be replaced. Visitors know they can always come to us and receive advice about avalanche conditions on their intended route. We are here for one reason— public service, helping those visiting the area any way we can. The Forest Service employs four Snow Rangers whose responsibility is public safety. Our two priorities are putting out a daily avalanche forecast in a timely manner for eight gullies in Huntington Ravine and eight gullies and snowfields in Tuckerman Ravine and acting as lead agency for search and rescue (SAR) events in the area.

Assessing avalanche hazard is an art that involves never turning off the senses. Our minds begin collecting data as soon as we wake. Listening to the winds howl outside, the way the snow brushes off our cars, how snow swirls over the guardrails on the way to work, and the way snow crunches underfoot as we approach the Forest Service garage are all tiny bits of information that we begin to assimilate before determining the danger rating for the day. The "on the clock" day starts at seven a.m. in our garage which houses a snowcat and two snowmobiles. These three machines are critical to our task of timely forecasts and SAR response. On the way into the ravines we talk with as many folks as we can about what is happening in the snowpack, the ravines, particular gullies, and the weather forecast from the Mt. Washington Observatory. In mid-winter these contacts often number in the hundreds. When March, April, and May arrive, the numbers become daunting as up to 3500 people may head into Tuckerman on a sunny weekend day for spring skiing. When we think we have seen it all, each spring skiing season brings a whole new set of unbelievable situations. The ignorance of some is often staggering. "Why is that party of six tied into one rope marching up Left Gully, through waist deep snow, when it is posted at "High" avalanche danger?" "Why is that guy getting into an inflatable boat on top of the Duchess, a 1500' long, 50 degree gully?!!" And then there's the ultimate nightmare which seems to happen at least once a season...

It's late April/early May on a Saturday morning at seven am. The 6" snowfall overnight and westerly 40 mph winds has loaded all lee slopes with 2-4 feet of new wind slab causing HIGH avalanche danger. Pinkham Notch Visitor Center calls us over the radio. There are already 1,000 people in the parking lot or heading up the trail— the first wave should be here in 30 minutes! Some stories you can chuckle over, but this scenario is terrifying. What can we do? We manage the area without any explosives or control measures, so these are not options. We also do not close the ravine. Ok, how about the avalanche bulletin? What can we write to impress upon people the severity of the situation? We think back upon similar instances from the past and grimace. No matter what we post for the hazard, a few decide that they are mightier than the all-powerful avalanche and trudge up their intended run. Once the crowds see someone— anyone— in the "High" area, they seem to immediately determine "well, that area must be fine." The "Human Factor" pulls the once apprehensive into a false sense of security. The problem is unbelievable. How can we effectively relay avalanche awareness upon such a diverse user group? Families, college outing clubs, church groups, extreme skiers, recreational snowboarders, casual hikers, and inner tubers are just some of the categories of the 3,000 people that will be either watching or participating in high-angle snow sports by 1:00 pm. How can we effectively help the average Mt. Washington visitor to understand the hazards they are encountering when using Tuckerman and Huntington Ravines? How can these visitors make educated decisions and mitigate the hazards they face? Why is the mix of eastern terrain, arctic-maritime weather, and the human factor of the diverse Easterner a problem in avalanche terrain? Ultimately, who are these people and what drives them to be here?

The Problem: The "Human Factor" of the Easterner, the Objective Snowpack in a Climate of Uneducated Users, Arctic Weather Conditions, and Easy Access to Avalanche Terrain

Easterners are unique individuals in the avalanche world. They love and pursue their snow related sports as much as in the West. However, they do so mostly out of the avalanche environment. They don't contend with road closures, ski areas closings to complete control work, avalanche zoning for housing construction, wearing a transceiver while driving over a pass, driving through snow sheds, etc.— the constant reminders that many Westerners go through winter to winter living in snow country.

The east coast commercial ski area is 99% avalanche free— with the exception of a few unique alpine snowfields or on rare occasions, manmade snow avalanches. Both of these rarely cause a hazard for the skier. Most eastern ice climbing,

but not all, usually occur in areas free from avalanche hazard. So the Easterner is brought up in an environment free from avalanche hazard. This has allowed him or her to master their particular sport before avalanche awareness has even entered the picture.

This is not a uniquely eastern phenomenon; however, throughout North America, avalanche professionals are confronted with users whose skills in skiing, snowboarding, ice climbing, or snow machining far surpasses their avalanche skills. In the East some avalanche hazard exists throughout the entire area. However, this hazard is relatively rare until you reach Northern New England. The mountains from the Adirondacks through Vermont, New Hampshire, and into Maine hold over 95% of the avalanche terrain in the eastern United States. Avalanche terrain continues into Quebec, including the Chic-Chocs of Gaspe and La Monte Valaines outside the city of Chicoutium. The two areas with significant avalanche terrain within the eastern United States include Katahdin in central northern Maine and the Presidential Range in northern New Hampshire within the White Mountains. Due to Katahdin's remote location and the Maine State Park's rigorous screening process, the area sees relatively few people through the course of a winter. In addition, the state park rangers close the mountain if they perceive there is avalanche danger with a red light/green light system. This red light/green light system restricts access to major avalanche terrain and is another factor limiting exposure to terrain in the Katahdin area.

Then there is the Presidential Range. This mountain range includes 12 major ravines or gulfs, 10 of which have significant avalanche hazard. In the midst of these stands is Mt. Washington whose eastern flanks include Tuckerman and Huntington Ravines. This area has been "the" area to go to for a winter mountain experience. Since the 1920's, Tuckerman Ravine has been actively used as one of the earliest ski areas in the country. Before the days of cut ski trails Tuckerman Ravine offered excellent access to large open snow fields. Neighboring Huntington Ravine— known as the birthplace of American ice climbing— has also been very popular since the first routes were established in the 20's. Until the late 1960's, with the ice revolution and radical equipment innovations, Huntington Ravine was considered one of the most technically difficult ice climbing areas in the country. Today Huntington is not seen as a technically challenging area, but it is seen as one of the most committing areas in the country due to Mt. Washington's horrendous arctic weather.

The Mt. Washington area is notorious for a number of reasons. First, it is a convergence of 3 major storm tracks. Storms come across the country, down from Canada— (often seen in the Alberta Clipper track)— bringing arctic temperatures, and up the coast bringing heavy precipitation called a Northeaster. Mt. Washington can see these storms hitting back-to-back. A common scenario may involve midwinter precipitation dropping an inch of rain at 32 degrees F. Overnight, as an arctic front barrels in from the NW with winds between 100 and 120 mph, the temperature may drop 40-50 degrees. The snow surface becomes a sheet of ice. Twenty-four hours later a Northeaster drops a foot of new snow on the ice layer causing widespread avalanche activity. Clearly, the mix of arctic and maritime climates work together to develop a unique avalanche situation in the United States. The symbiotic relationship is an ideal environment for "direct action" activity (avalanching that occurs during or immediately after a storm).

Mt. Washington has been considered an excellent place to train for the big mountains such as the Alaska range or the Himalaya. However, a misunderstanding exists. True, it is an excellent place to train for the big mountains because conditions can equal any big mountain in the world reserving susceptibility to altitude problems. But, overwhelmingly, it is a great training location for one reason: access. Mt. Washington is one of the most dangerous mountains in North America due to its easy access to the urban centers of the East. Seventy million people live within a day's drive of the White Mountains. This proximity, along with a state that maintains its highways very well, equals quick access. Once an individual arrives at Pinkham Notch and parks at the visitor center he or she can be in either Tuckerman or Huntington Ravine in about one hour. It is this easy access that causes diverse individuals to visit the mountain. On any one day we see both the world-class mountaineer training for a Himalayan trip and the family of four in jeans and sneakers with soaking wet feet who are "just going up to watch." Because of this phenomenon Washington is referred to as the LITTLE Big Mountain.

Although not unique to New England the ultimate problem comes down to the objectivity of the unstable snowpack. The chute, the snowpack, and the weak layer don't care what your experience level is— whether it happens to be 30 years of avalanche forecasting experience or the first day your eyes see snow. It is objective. It has no concern that this is your only weekend to ski the backcountry, that you drove 6 hours, or that you've skied 2 hours to get first tracks. Your weight transfer through the snow pack is all that matters— the relationship between stress and strength. Basically, weight that overcomes the strength of the weakest layer in the snowpack precipitates the danger.

When the four factors are mixed: the "human factor" of the Easterner, Arctic conditions, easy access, and the objective snowpack in a world of uneducated users, an environment is generated that is conducive to tragedy.

The Solution: Education and Information in All Forms

Education in avalanche awareness, as in all subjects, is a matter of following an orderly progression to get to the root of the issue or problem. In the avalanche environment it is critical that we get to the visitor before he or she arrives at the root of the matter—avalanche terrain. If a visitor's first avalanche exposure is at a backcountry hut reading a warning describing moderate avalanche danger for the day, it is, in many ways already too late. The individual asks, "What is

Moderate?" "Well, it says here in the bulletin that avalanches are 'possible.'" To many this doesn't sound too bad. Moderate conjures up images similar to middle-of-the-road, medium, average, mild, and even to some, reasonable. Without education and the understanding of what "Moderate" can mean, many let their guard down. "It is only Moderate... right" But the fact is that nationwide more people are killed or injured under "Moderate" hazard than any other type of avalanche conditions.

It is critical to give this individual an opportunity to educate him or herself. Ultimately, the responsibility is on the visitor to avalanche country to seek out the information available to them. However, by actively offering numerous levels of avalanche education, we create an atmosphere which encourages participation.

The tragedies of 1996 in the end have had some positive impacts on the participation in avalanche education. Easterners were slapped in the face. "How could this happen here?" Unfortunately, in the realm of the avalanche demons— ignorance is not bliss. All at once backcountry users wanted to go to a slide show or take an avalanche course. We have recognized the insatiable appetite for avalanche awareness from the public— and responded.

Approximately two dozen slide shows are scheduled annually around the Mount Washington area to spread the gospel about avalanches, self-rescue, and awareness about the USFS program and our role on Mt. Washington. Our general avalanche information also continues to increase. Our home page, TUCKERMAN.ORG, containing safety information about the Ravines and the daily avalanche forecast began last year. A double-sided six-panel Tuckerman brochure is also available. Within a month a 2.55 x 4.5" avalanche card will be available that will include some avalanche basics, the 5-scale warning system, and phone numbers to access the 24-hour avalanche information recording.

In addition to the NSP "Basic Avalanche Course," and the "Advanced Avalanche Course," that we have offered for years, we have started the process of considerably expanding our avalanche education and information programs. On the education front the greatest goal is the elimination of an avalanche course "waiting list." We are currently in a situation where more individuals want to take a course than we have slots to accommodate. We must overcome this, and we are on the road to succeeding. In addition to the above courses we now hold two avalanche rescue courses and are in the process of developing curriculums for several other courses with different groups. We are working with Chauvin Guides International, International Mountain Climbing School(IMCS), and SOLO to develop and hold avalanche awareness and higher level courses on a yearly basis. Each program discusses attitude in avalanche country, the avalanche triad— (snowpack, weather, terrain), safe travel and route finding in avalanche terrain, self-rescue including the all important beacon, probe, and shovel, and understanding the avalanche danger rating system. This last category should not be underestimated in importance. Although it is up to each person to evaluate in the field whether they are going to cross an avalanche-prone slope or not, the current avalanche posting can be a valuable tool in making a decision. In the East a majority of those traveling in avalanche terrain do so where an avalanche bulletin is issued daily. They do so without any avalanche awareness or understanding of what the danger for the day— Low, Moderate, Moderate/High, High, or Extreme— means. For example, "Low" is often misunderstood to mean no danger. Or as stated earlier, "Moderate" generates feelings of complacency or ambivalence. It is for this reason that the danger scale rating should be discussed and explained in any eastern avalanche awareness program. By offering these various levels of educational programs, we give individuals opportunities based on their interest and time availability. The goal is to provide a number of options for conflicting schedules in our busy world. If individuals have a dozen options or more, there is a greater likelihood they will take a course. More courses also allow for smaller enrollments enabling participants to receive more attention. Positive experiences in these courses will lead participants to encourage friends to pursue the same experience. In varying degrees this gets the participant started down the road to understanding the infinite world of avalanche awareness.

We hope that this dramatic increase in information and education is sought out and used to increase awareness of what most have seen as a mysterious topic— the avalanche. Once a basic understanding is developed, we can eliminate the fear generated through ignorance and enjoy the beauty of the mountains in a safer manner.

All of us enjoy challenging ourselves in the outdoors. Being outside is something that drives many of our lives. The thought of "challenging the mountains" conjures up images of, defeat, fulfillment, and victory. Our outdoor skills develop over years which allow us to have better understanding of our environment. However, there must be an understanding of the difference between challenging the outdoors and challenging the avalanche demons. You cannot continue challenging avalanches and not pay the price. As the saying goes, "If you live by the sword, you die by the sword." This fact must alter the way we think about the mountains. Over time, we need to learn how to work with the hazards of snow. Time in the field, under competent instruction, develops skills in safe travel techniques, the recognition of instability and weak layers in the snow pack, and a long life in snow country. Through this experience we learn that it is not "a matter of opinion." Different human opinions do not influence the mountain or snowpack. Snow instability is there, it is factual, but it is up to us to seek out the information and clues the mountain is giving us to evaluate the degree of slope stability. When we can respect and accept the mountain on its own objective terms and leave arrogance behind, we will understand nature's power over us. Only then are we ready to learn and educate ourselves before the avalanche teaches us a hard lesson.

Humility allows us to see that we can never win. We must play the game on the mountain's terms— every time, from the

first day for the rest of our lives. From day one we must understand who is in control, who is Alpha, in charge, more powerful, and who ultimately can take our lives. Before learning any of the fundamentals of avalanche awareness, safe travel, stability tests, natures warning, we must become aware of ourselves and the attitude we bring into the hills. It is only through this change in attitude and mindset that we can humbly live and play in avalanche terrain.

About the Author: Chris Joosen is in his fifth season as a United States Forest Service Snow Ranger in the Tuckerman & Huntington Ravines of Mt. Washington. As a professional member of the American Association of Avalanche Professionals, he spends much of his free time attending and instructing avalanche training programs. Chris has a Bachelor's of Arts Degree in Government and Public Policy from Eastern Connecticut State University. Also an EMT-B and WEMT, Chris can be found climbing, skiing, and biking in Northern New England and anywhere the snow tends to fall!

CARING FOR THE AVALANCHE VICTIM

By Buck Tilton

In two out of every three deaths by avalanche, the victim suffocates. Most of the remaining fatalities are the result of trauma, usually to the head and neck (cervical spine). Almost all living victims are suffering, to some extent, from shock and hypothermia, and they may have other injuries hidden inside their cold-weather clothing. They need to be transported out of the mountains. Immediate care of any avalanche victim involves 1) basic life support, and 2) stabilizing their cervical spine in case it has been injured, and 3) treatment for shock and cold injury. Extended care of the victim requires a complete check (assessment) for any other problems, treatment of the problems, prevention of further injury, and evacuation of the victim. None of this care can be neatly outlined, memorized, and followed exactly when needed. Each situation is different, every emergency unique. Sound judgement should lead to reasonable acts based on knowledge and experience.

BASIC LIFE SUPPORT

All haste should be made to uncover the buried victim's head first, being careful not to cut them up with your shovel in the rush to save them. It is usually quicker to dig from slightly downhill and angle in to a victim buried more than three or four feet down, since it's easier to shovel the snow out of the hole you're digging. As soon as their face is uncovered, clear their airway by removing any clumps of snow from their mouth and nose, and continue digging until their head, chest, and diaphragm are free. Open the victim's airway safely by stabilizing their head and neck with two hands while pushing up on the angle of their lower jaw with your index fingers (the jaw thrust), or by stabilizing the head with one hand and lifting the chin with the other (the chin lift). Check for breathing, and start mouth-to-mouth resuscitation, if needed. As digging continues, someone, ideally, should check for a carotid pulse. A great deal of effort should go into checking for a pulse. It is often very difficult to detect pulses in a cold victim, and failure to find one does not mean all hope is lost. Certainly, the old adage applies here: no one is dead until they are warm and dead.

When should cardiopulmonary resuscitation (CPR) be started? This is not an easy question to answer. There is a possibility the victim has a cold, rigid heart, beating weakly, but with enough energy to maintain life. A cold heart is fragile, and CPR will likely cause it to stop beating. And, if a victim has cooled to the point where their body has grown rigid, CPR won't work anyway. On the other hand, if they are dead and only semi-cold, CPR has an excellent chance of saving their life. Generally, if the victim has been buried less than two hours, and they are pulseless, CPR should be started, and continued as long as it doesn't create a risk to the rescuers. After two hours of burial, CPR will probably be either useless or more dangerous than helpful. Statistically, CPR seldom works on dead avalanche victims.

Although severe bleeding is uncommon in avalanche victims, they still deserve a check for life-threatening blood loss. Bleeding may be hidden deep inside bulky clothing, and the only way to check is to run your hands quickly underneath heavy parkas and sweaters.

STABILIZING THE CERVICAL SPINE

Conscious or unconscious, all victims should be removed from the snow gently. As mentioned, rough handling may stop a cold heart. Mismanagement of a damaged cervical spine carries the additional risk of turning a victim with an unstable neck into someone forever paralyzed . . . or dead. All avalanche victims have a broken neck until proven otherwise. Ideally, one rescuer should hold the victim's head and neck stable while other rescuers take hold of the victim's body and move it as a unit, under direction of the head-holder, out of the snow. With a shortage of rescuers, do the best you can. Gentle dragging of the victim may be the safest option. Unfortunately, even in conscious victims, only X-rays can ultimately detect the presence or absence of spinal injury. The safest procedure is to improvise a cervical collar to hold their neck reasonably stable during the transport out. And, on the transport out, the victim should be secured to a rigid litter or toboggan to prevent further spinal damage.

HEAD INJURY

Sometimes head injuries are obvious, but the avalanche victim tends to demonstrate more subtle signs and symptoms indicating their brain is swelling inside of a very enclosed space, their cranium. If conscious, they become increasingly disoriented, irritable, and combative . . . and, later, deeply unconscious. They may complain of a headache, and they like to vomit. Their heart rates will slow down and increase in strength, and their breathing often becomes erratic. They may

start to show unusual bruising around their eyes (if a slab hit them in the front of their head), or behind and below their ears (if the slab hit them from behind). Treat them as if they had a cervical spine injury, and try to keep their head slightly higher than their feet. If they're having difficulty breathing, start mouth-to-mouth breathing for them, ventilating them each time they try to take a breath on their own. If a rescue team has arrived with supplemental oxygen, start a high-flow rate immediately. Rapid evacuation is critical. Unfortunately, patients with serious head injuries seldom do well when a hospital is far away.

SHOCK

Expect all avalanche victims to demonstrate, to some extent, signs and symptoms of shock: rapid and weak heart rate, rapid and shallow respiratory rate, pale and cold skin (which is due, at least partially, to the snow), and an altered level of consciousness. Shock describes the condition of an inadequate flow of well-oxygenated blood. Injuries, pain, fear, and cold are all a part of the problem. Shock can kill, even long after the victim has been recovered from beneath the snow.

Field treatment for shock should include maintaining an open airway, getting the patient warm and dry, and lying down with their feet slightly higher than their head. Avalanche victims are often dehydrated, which adds to the problems of shock and cold. If they are fully conscious, they may be given fluids, preferably warm fluids. All treatment should be given in a calm and reassuring manner. Supplemental oxygen, once again, would be very beneficial. As you treat for shock, you are also treating for hypothermia.

HYPOTHERMIA

You may also expect all avalanche victims to be suffering from hypothermia, a loss of body core temperature. Anyone who stays too cold for too long will have serious disturbances in the normal functioning of their body. Mild hypothermia causes loss of mental acuity, incoordination, and, as the victim's core temperature drops to around 95 degrees Fahrenheit, uncontrollable shivering. More profound hypothermia may result in a comatose patient with barely detectable, sometimes undetectable, pulse and respirations, and rigid muscles. They often look dead. Profound hypothermia is not common in avalanche victims, however, since they more often die of suffocation or trauma before they cool off that much.

For all hypothermics, treatment includes getting them out of the wet and cold and into the warm and dry. First, get them out of the snow, preferably into some form of shelter and onto an insulating layer. Remove their clothing, gently, and bundle them up in thick insulation: dry clothing, sleeping pads, other people. A radiation barrier, such as a sheet of plastic, space blanket, or a tent's fly, as a final wrap, will insure the patient retains as much body heat as possible. The total product is sometimes referred to as a "hypothermia wrap." Chemical heat packs or warm water bottles, placed inside the "wrap" at strategic areas of their body (neck, armpits, groin, palms of the hands, soles of the feet), will do much to help them rewarm. If they are conscious, fix them something warm to drink.

Unconscious hypothermics, especially those that seem dead, require very gentle handling. Remember, they are fragile from the cold. They should be treated with the same hypothermia wrap. But don't try to force warm drinks down their throats. Of great benefit would be a high-flow of warmed, humidified oxygen, but you won't have that unless a rescue team has arrived. If the severely hypothermic patient seems breathless, start mouth-to-mouth breathing for them. Your personal low-flow of warmed, humidified oxygen will help.

FROSTBITE

Frostbite is frozen tissue in a localized part of the body. It can be very superficial, involving only skin, or very deep, involving bone. Frostbitten tissue is cold, pale or white or gray, and stiff. As freezing goes deeper, the tissue becomes stiffer and stiffer until, finally, it is rock hard. Superficial frostbite, where the skin moves easily when gently pressed, should be rewarmed immediately with skin-to-skin contact. Deep, hard frostbite should be rewarmed in a stable environment through immersion in warm water. Patients with hard frostbite almost always do better if the injury is wrapped with dry insulation and left for a physician to manage in a controlled environment. For any frostbite injury, do not rub it and do not put it near an open flame or any other high heat source. For any frostbite that has thawed, protect it carefully from being injured or refrozen.

ASSESSMENT

A breathing, pulsing victim needs to be checked over for other injuries. When this takes place depends on unpredictable factors including the basic life support requirements (you may never get to do a full assessment), the severity of the weather, and the number of rescuers. Assessments should go from head to foot. Squeeze bones, move joints gently, look for cuts and bruises, check for anything that hurts or feels abnormal. Your survey should not unnecessarily expose the victim to the cold. In some cases, you may choose to identify injuries only and postpone treating them until the victim has been warmed.

A check should be made of their vital signs, especially level of consciousness, heart rate, respiratory rate, and their skin. A normal person will be able to answer questions reasonably, particularly questions in reference to who, what, when, and where. Normal heart rates range from 60 to 80 strong beats per minute, and normal respiratory rates from 12 to 20 unlabored breaths per minute. Skin, in the non-pigmented areas (i.e. mucus linings of the lips and eyes), should be pink and moist. Changes in vitals don't tell you what's wrong, but they do indicate changes in the condition of the victim. Changes toward normal are healthy, and changes away from normal are unhealthy.

TREATMENT OF INJURIES

Unstable and painful bones and joints should be well-padded and splinted. Open wounds should be cleaned, dressed, and bandaged. Secure splints and apply bandages snugly, but loose enough to allow healthy circulation.

PREVENTION OF FURTHER INJURY

Once stabilized, victims should be monitored carefully for any changes in their condition. The less alert they are, the more carefully they need watching. Not only their injuries need monitoring, but also their body temperature, fluid needs, and food needs. They may require help in attending to their bodily functions.

Do not underestimate your patient's need for psychological support. Often the greatest good can be achieved with the warmth of human understanding . . . not a cheerleader and not a detached observer, but someone in-between, someone who quietly and confidently lifts the spirits of the avalanche victim.

EVACUATION

Transport of the avalanche victim is the final stage of care. Transport begins with the determination of what type of evacuation will be required. Can the victim walk or ski out? Can you carry the victim on your back? Is your party large enough and strong enough to do a safe carry? Can you improvise a litter or a sled to move the victim in? Do you have enough equipment and food to support the group during the evacuation? Would it be wiser to send for more help instead of trying to self-evacuate? Who will you ask for help? Are helicopters or snowmobiles available in your area? The answers to these questions will determine how you get your victim out.

SAFETY SUMMARY

Once located and removed from the snow, avalanche victims require immediate attention to their basic life support systems: airway, breathing, circulation. Priority attention should be given to their cervical spines, and to the possibility of head injury, shock, and hypothermia. As assessment should be made of their condition, and treatment given for all noted and suspected injuries. They should be monitored in order to prevent, if possible, a worsening of their condition. Pay special attention to their need for an adequate airway, for maintenance of body heat, for food and fluid needs, and for psychological support. Evacuate the victim as soon as it is safely possible.

WANT MORE INFORMATION?

Avalanche Education

American Avalanche Institute, Inc.
PO Box 308, Wilson, Wyoming 83014; 307-733-3315

American Association of Avalanche Professionals (AAAP)
PO Box Drawer 2757, Truckee, California 96160

Canadian Avalanche Association Training School
PO Box 2579, Revelstoke, British Columbia, V0E 2S0 Canada; 604-837-2435

National Avalanche School
National Ski Patrol System, Inc., 133 South Van Gordon Street, Suite 100, Lakewood, Colorado 80288-1706

Appalachian Mountain Club
PO Box 298, Gorham, New Hampshire 03581;603-356-2727

International Mountain Climbing School (IMCS)
PO Box 1666, North Conway, New Hampshire 03860; 603-356-6316

Chauvin Guides International
marc@chauvinguides.com; 603-356-8919

Publications

The Avalanche Book by B. Armstrong and K. Williams, Fulcrum, Inc., Golden, Colorado; 800-922-2908

The Avalanche Handbook by D.M. McClung and P.A. Schaerer. Mountaineers Books, Seattle, Washington; 800-553-4453

The Avalanche Review, a publication of the American Association of Avalance Professionals, PO Box 2757, Truckee, California 96190; 916-587-3653

Avalanche Safety for Skiers and Climbers by Tony Daffern. Rocky Mountain Books, Calgary, Alberta, Canada; 800-566-3336

Snow Sense: A Guide to Evaluating Snow Avalanche Hazard by Jill Fredston and Doug Fesler. Alaska Mountain Safety Center, Anchorage, Alaska; 907-345-3566

Snowy Torrents 1980-1986 by Nick Logan and Dale Atkins. To order: Attention: Orletta Fairchild, Publications Department, Colorado Geological Survey, 1313 Sherman Street, Room 715, Denver, Colorado 80203; 303-866-2611

The Basic Essentials of Avalance Safety by Buck Tilton. ICS Books, Inc., Melville, Indiana; 800-541-7323

Continued on page 9, column 1

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UNITED STATES AVALANCHE DANGER SCALE - 1998 UPDATE

Editor's Note: Following the October meeting of the American Association of Avalanche Professionals (AAAP), a group of backcountry avalanche forecaster from around the country met to revisit the 5-tiered avalanche danger scale (printed in Nov/Dec 1996 issue of WMN) and various other issues. When all was said and done the term "Moderate-to-High" was changed to "Considerable" for a number of reasons. Karl Birkeland summarized these reasons in the AAAP's "Avalanche Review" newsletter as follows:

1. People found "moderate-to-high" to be confusing. Many users didn't realize "moderate-to-high" was its own category, instead believing that the forecasters "couldn't make up their minds between moderate and high, so they just called it 'moderate-to-high.'"

2. When people in avalanche classes were informally polled on whether they preferred "considerable" or "moderate-to-high" they chose "considerable" by a 2 to 1 margin.

3. Several forecasters felt that using the term "moderate-to-high" increased the awkwardness of the advisories and made putting out effective advisories more difficult.

4. Salt Lake is gearing up for the 2002 Olympics and they wanted to be on the same page as the rest of the English-speaking world and use the word "considerable."

Most avalanche centers will be adopting the term this year. An updated summary of the 5-tiered chart follows.

AVALANCHE SAFETY BASICS

Remember that avalanche danger rating levels are only general guidelines. Most avalanche accidents are caused by slab avalanches which are triggered by the victim or a member of the victim's party. However, any avalanche may cause injury or death and even small slides may be dangerous. Always practice safe route finding skills and be aware of changing conditions. Learn how to use, and always carry, avalanche beacons, probes, and shovels. *You must be able to carry out* a self rescue in the event of a burial as time is critical. If you must go for help, it is generally considered too late. Learn to recognize avalanche terrain and understand snow stability evaluation techniques to help minimize your risk. Distinctions between geographic areas, elevations, slope aspect, and slope angle are approximate and transition zones between dangers exist. No matter what the current avalanche danger there are avalanche-safe areas in the mountains. Seek out information needed to locate these areas and make educated decisions.

Avalanches don't happen by accident and most human involvement is a matter of choice, not chance.

United States Avalanche Danger Descriptions

Danger Level (& Color) ...WHAT...	Avalanche Probability and Avalanche Trigger ...WHY...	Degree and Distribution of Avalanche Danger ...WHERE...	Recommended Action in the Backcountry ...WHAT TO DO...
LOW (green)	Natural avalanches very unlikely. Human triggered avalanches unlikely.	Generally stable snow. Isolated areas of instability.	Travel is generally safe. Normal caution advised.
MODERATE (yellow)	Natural avalanches unlikely. Human triggered avalanches possible.	Unstable slabs possible on steep terrain.	Use caution in steeper terrain on certain aspects.
CONSIDERABLE (orange)	Natural avalanches possible. Human triggered avalanches probable.	Unstable slabs probable on steep terrain.	Be increasingly cautious in steeper terrain.
HIGH (red)	Natural and human triggered avalanches likely.	Unstable slabs likely on a variety of aspects and slope angles.	Travel in avalanche terrain is not recommended. Safest travel on windward ridges of lower angle slopes without steeper terrain above.
EXTREME (red w/black border)	Widespread natural or human triggered avalanches certain.	Extremely unstable slabs certain on most aspects and slope angles. Large destructive avalanches possible.	Travel in avalanche terrain should be avoided and travel confined to low angle terrain well away from avalanche path run-outs.

Continued from page 7, column 2

Other Resources

www.avalanche.com — Houses a comprehensive list of workshops, books and videos.

www.csac.org — Cyberspace Snow and Avalanche Center lists current conditions, plus.

www.tuckerman.org — Information and avalanche forecasts for Tuckerman and Huntington Ravines.

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Back issues of the Wilderness Medicine Newsletter are available. Please specify issue(s) and send your request to P.O. Box 3150, Conway, NH 03818

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May/June '97	Bats & Rabies
Mar./Apr. '97	Drowning
Jan./Feb. '97	Managing Fractures
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Mar./April '95	Outdoor Leadership—Past & Present
Jan./Feb. '95	Legal Issues
Nov./Dec. '94	Principles of Wilderness EMS
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July/Aug. '94	Ozone & Ultraviolet Light
May/June '94	Zoonoses
Mar./April '94	Wilderness Pediatrics
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The bellows sound makes plain we've nearly reached
The end, with one wing left on which to fly.
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An open door will always feed a draft--
So, post-haste, plug it with an airtight piece
Of plastic--use a Ziploc for your graft.
If soon the windpipe flexes like a bow,
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"The world is our emergency room."

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Wilderness Medicine Newsletter
FOR THE RECOGNITION, TREATMENT, AND PREVENTION OF WILDERNESS EMERGENCIES

MARCH/APRIL 1998 ISSN-1059-6518 VOLUME 9, NUMBER 2

ADVANCED LIFE SUPPORT IN THE BACKCOUNTRY

by Matthew Russell, NREMT-P

Is there any use for "Advanced Life Support" (ALS) techniques in wilderness medicine? As the discipline of wilderness medicine has grown, this question has become one of significance for many people. With the success of programs teaching the curriculum of "Wilderness First Responder" (WFR) and "Wilderness Emergency Medical Technician" (WEMT), many who see the parallels with other aspects of EMS[1] have begun to ask about the use of EMT-Intermediate and Paramedic training in the wilderness environment. However, there are many concerns surrounding the issue of how one could apply ALS in the wilderness. In general the debate centers around two issues: 1) How can we create a safe system for the use of wilderness ALS? and 2) Which ALS skills might be most useful in the backcountry environment?

Even though there are obvious aspects of advanced EMS training that can be applied directly, the approach to injuries and illnesses is not appropriately transferable between the street and wilderness environments. While a *direct* translation of ALS is neither desirable nor appropriate, there is room for the development of a comparable system for the backcountry. This article describes such a system and how, through it, there may be a role for ALS techniques in the wilderness. To begin this discussion, one must first start with a clear understanding of the terms and definitions in the debate. This can be best achieved with an understanding of the history of ALS.

The Background of Advanced Life Support

ALS in the streets generally refers to the use of invasive or "advanced" procedures and medications. These skills are taught to advanced providers[2] and are used in conjunction with the techniques of Basic Life Support (BLS). It is BLS that comprises the core of pre-hospital medicine and is the level to which all EMTs are trained. As pre-hospital medicine evolved, the concept of ALS became entirely centered on the administration of critical interventions for people in cardiac arrest. This resulted from the urgency of providing defibrillation within *minutes* to those in ventricular fibrillation (Vfib). Along with defibrillation, pre-hospital personnel were also trained to deliver drug therapy in cardiac arrests. This required the initiation of "invasive" techniques such as the placement of intravenous (IV) lines and endotracheal intubation. As time went on, the argument was made that since these personnel were already trained to start IV's and give medications, there might be other areas in which these skills could be utilized. Thus ensued the expansion of ALS care to other illnesses and injuries. Even today, however, the major emphasis of ALS is the critical cardiac patient.

The focus street ALS places on the treatment of cardiac patients is clearly not appropriate for the wilderness environment. It makes no sense to emphasize therapies that are designed to save *minutes* when the time span for wilderness patient care is measured in *hours and days*. However, the skills of ALS (intubation, IV therapy, and medication administration) can readily be translated to the wilderness patient. This is in part because the time factor in wilderness emergencies is so large that the benefits of initiating therapy can outweigh the risk of delay. An extra five minutes taken during a multi-hour rescue is relatively inconsequential. In fact, arguments advocating *additional* treatments beyond the standard ALS repertoire are commonplace, and are referenced repeatedly in most wilderness medicine texts[3].

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Where to begin?

The application of ALS techniques in the backcountry requires a strong contextual approach. First, it must be determined which injury or illness patterns are likely to be encountered. As mentioned earlier, street ALS focuses on the cardiac patient -- backcountry ALS should not have that same emphasis. Instead, a wilderness ALS system must focus on treating the injuries commonly seen in the backcountry. These include trauma, heat and cold injuries, and a more limited spectrum of medical conditions.

Due to both the differences in the length of patient contact and the nature of the injuries treated, the types of medications and interventions needed are often substantially different from those utilized in the street. Although it might seem absurd to consider starting antibiotic therapy during a ten-minute ambulance ride, it may be appropriate during a ten-hour evacuation. In fact, in the wilderness situation where transport times can range from several hours to several days, the therapeutic importance of delivering advanced care is most likely *increased*.

Wilderness medicine differs from conventional medicine in several ways: environmental exposure, time delays to definitive care, and limitation of resources. However, the resources are not always limited in the same way. In many areas, the potential for an organized response to a wilderness emergency exist -- in fact, in many areas it is already a reality. The concept of an *organized* response applies not only to SAR teams, but is also extendible to other situations: expedition medicine, professional guiding groups, organized trips, etc. In every case, the key difference is a *preplanned* response to a wilderness emergency. This sort of thinking and application basically describes a *Wilderness EMS System*.

"Recreational" and "Professional" Care Providers

One thing about ALS in the backcountry is that it has serious limitations. No one is advocating that the average hiker start carrying IV fluids and medications in his daypack, even a hiker trained in their proper use. It will never be the case that wilderness care providers trained in ALS will always be immediately available in case of an injury -- that, after all, is part of the definition of wilderness care. For that reason, basic level wilderness care will (and should!) remain the mainstay of approaches for most backcountry injuries. Having said that, ALS therapy can provide an important *supplement* in caring for the wilderness patient.

One can start by distinguishing between two types of wilderness care provider -- the "*recreational*" WEMT and the "*professional*" WEMT. The *recreational* WEMT is one who happens to be present, nearby, or is otherwise available by sheer fortune at the scene of a wilderness emergency. For example, a WEMT out for a hike stumbles across a hiker who has fractured an ankle and stops to help. This can be held in contrast to the *professional* WEMT who is part of an organized response to a wilderness emergency called to help with the evacuation of a hiker with a fractured ankle.

Why make such a distinction? The difference lies in preparation and the availability of resources. A *recreational* WEMT will have available only what happens to be around, while a *professional* WEMT has the potential to bring a more extensive set of emergency resources into a situation. By this I mean that while no one would rationally advocate that every *recreational* WEMT carry IV solutions or pain medications around in a daypack, one does not have to say the same thing about a *professional* WEMT who is responding with the express purpose of going out to treat a patient in the wilderness. In this regard the *professional* WEMT benefits most from the application of ALS in the backcountry.

Setting up a Wilderness EMS System

It could be argued that having some sort of Wilderness EMS System (that is, an organized approach planned in advance) is a *prerequisite* for ALS in the backcountry. Furthermore, it is equally necessary for an additional step to be taken -- the development of "medical command" for the backcountry. The current practice of ALS in the streets relies on a sophisticated relationship between personnel trained in advanced care and physicians. ALS is practiced only after medical approval by a physician ("medical command"), either by direct communication or though the use of established protocols. This system is in place for many reasons, but most importantly to serve as a safeguard for the use and application of ALS techniques that may pose serious risks. The correct use of medical skills relies not only on the technical proficiency of the provider, but more importantly, on the provider's judgment in determining when and on whom an intervention should be applied.

The subsequent need to build a good relationship between an EMT and a medical command physician creates a particular problem for wilderness medicine providers. Many people trained and certified as Wilderness First Responders or EMTs are primarily outdoorspeople who, after completing their course, return to their activities without ever participating in an organized EMS system. Several consequences result:

- Upon completion of a course, the participant no

longer receives regular practice or exposure to thinking as a WEMT. Without practice, skills decline.

- It leaves the *recreational* WEMT without the benefit of clinical experience performing real assessments, on which all treatment decisions are based. (There is a saying, "Good judgment comes from experience, and experience comes from bad judgment.")

- Deprived of the benefit of operating within an organized EMS system, the WEMT is left without a sufficient understanding of how to operate in an often intricate system for providing advanced care. Specifically, the relationship of working with a medical command physician is absent. Without practice working with a command physician there is no mechanism to hone clinical and communications skills. These skills can be critical as they can allow the WEMT to draw on the experience and judgment of a more highly trained person at a distant location.

Keeping this in mind, it is important to understand that the teaching of wilderness ALS care must be aimed at the *professional* WEMTs who are part of an organized Wilderness EMS System that includes a command physician[4]. Ideally, for the Wilderness EMS System, the command physician should be familiar with the discipline of wilderness medicine. Such physicians shall hereafter be referred to as Wilderness Command Physicians (WCP).[5]

The development and use of ALS techniques in the backcountry should only occur in conjunction with the continued development of organized Wilderness EMS Systems. Such systems can range in nature and design by location and are not limited to organized SAR teams. For example, professional outdoor organizations can, and often do, work with a physician to design a system of providing emergent backcountry care. A number of organized expeditions often pre-plan for the management of emergencies. Again, the key elements to address are: 1) the additional training sessions, 2) the exposure to working within an organized system, 3) the development of a relationship with a medical command source, and 4) an explicit and systematic approach to the provision of ALS care for a given environment.

Obviously, these conditions place a large limitation on ALS in the backcountry, but such Wilderness EMS Systems already do exist in many areas. For example, areas of Pennsylvania, Maryland, West Virginia and other regions organized under the Appalachian Search and Rescue Council employ such systems. Most places where wilderness emergencies tend to occur with some frequency have already developed a method to address them. The people within these systems often seek training in pre-hospital patient care. As a result, there is tremendous potential to further organize and include advanced skills.

Advanced Life Support in the Backcountry

Once a wilderness EMS system that can manage ALS is established, one can then focus on the care that can be provided. This section describes a number of ALS applications in the wilderness, and mentions additional modifications of technique or practice that may be required in the wilderness environment. Again, it must be stressed that the proper context for the use of these interventions is part of an organized EMS response. This makes sense as it is unlikely (and actively discouraged) that the average recreational adventurer would consider carrying the sort of heavy and specialized equipment required on a routine basis.

Airway Management

Airway management techniques are the most important skills emergency medical personnel can utilize. Multiple adjuncts, including oropharyngeal, nasopharyngeal, and esophogeal obturator airways exist as tools to assist in the airway management. However, only the endotracheal (ET) tube is considered *definitive* treatment[6].

While in the wilderness setting the use of an endotracheal tube is likely to be both rare and complicated, it may be lifesaving. It should be noted that many patients whose conditions are severe enough to require intubation are likely to be deceased before the arrival of any wilderness EMS personnel[7]. The most likely scenarios for use of the endotracheal tube are for management of head-injured patients who are normothermic and unresponsive, submersion incidents, and in cases of severe hypothermia. In any case, the wilderness airway management of an unresponsive patient is extraordinarily difficult. Without an ET tube in place, patients must be placed on their sides to allow gravity to assist with the clearance of substances that might otherwise be aspirated[8].

It is important to note the complicated nature of managing the wilderness patient who has been intubated. Transport of such patients is exceedingly difficult (if available, helicopter evacuation is clearly merited). The tube placement must be monitored carefully and *continuously* as correctly placed ET tubes can be easily dislodged by any movement. During the logistic nightmare of a litter evacuation they are at a particularly high risk for displacement. While rarely required as the *only* tool for proper

management of these critical airways, endotracheal intubation can be an important intervention for use in the wilderness environment.

While technically not in the category of airway management, a brief discussion of needle chest decompression is warranted here. Needle thoracotomy is a simple and potentially life-saving advanced procedure in the face of a *tension* pneumothorax[9]. Pneumothoracies are a common consequence of injury to the chest, and can progress over time to become tension pneumothoracies. All patients who have suspected chest trauma should be monitored closely and continuously for pneumothorax.

Intravenous Fluid Administration

The use of IV fluids is the greatest asset an ALS provider can bring to the wilderness. In fact, while the role of IV fluids in street EMS is currently undergoing considerable debate, their role in the wilderness environment is far more certain[10]. While time and logistics will still prevent adequate resuscitation in the face of extreme trauma[11], almost every wilderness patient can benefit from fluid replenishment. In the instance where oral rehydration can be adequately accomplished, use of the IV fluids may not be necessary. However, almost all wilderness patients are dehydrated on initial presentation, and a number of factors may limit intake. Nausea, either pre-existing or induced by litter travel, pain, disposition, and absolute contraindications[12] are common occurrences that limit oral fluid use. Many conditions that can present in the wilderness environment (e.g., diabetic ketoacidosis[13], crush syndrome with consequent rhabdomyolysis[14], and adult respiratory distress syndrome[15]) can only be addressed with the use of aggressive IV fluids. Even the simple use of *maintenance* fluid replacement carries a significant role in the long-term care that wilderness providers encounter. Proper fluid management is a basic and absolutely critical component of wilderness care at all levels. By including the use of intravenous fluids however, ALS providers can initiate definitive care and management and have the greatest impact on patient care.

In addition to the benefits of fluid resuscitation alone, the use of IV therapy also expands the opportunity for routes of medication administration. There are a number of situations in the wilderness environment where IV medications can have a significant role. For example, antibiotics are especially useful in the case of open fractures by reducing the likelihood of potentially limb and life-threatening bone infections. Delay in the initiation of antibiotic therapy dramatically increases the risks of such infections[16]. Pain medications, minimal nutrition[17], and other drugs can also be delivered.

As in the case of endotracheal intubation, the use of intravenous fluids and medications in the wilderness carries additional considerations beyond those commonly addressed in the street. First, the types and quantities of fluids that are carried and available are going to be limited, so careful pre-incident planning is mandatory[18]. Second, careful consideration must be made to protect the fluids and medications from the environment both during rescue and transport. In particular, it should be noted that many medications can not be used after exposure to certain temperatures[19]. Additionally, the delivery of medications can be complicated. There are various systems that exist for protecting IV fluids from low-temperatures for delivery in cold environments, and pressurized administration[20] is often necessary. Finally, the use of IV solutions creates a potential for exposure to blood borne pathogens. Clearly the use of barrier protection is indicated; in addition, thought and pre-planning for the careful disposal and removal of used needles is an absolute must.

Medications

While the street ALS systems have providers carrying medications such as IV lidocaine and other anti-arrhythmics, such medications are unlikely to be of any use for the backcountry patient. The medications most likely to benefit the "ordinary" wilderness patient do include a number of medications used in the streets. Several additional medications that are not routinely used by ambulance personnel, such as antibiotics and steroids, should be added.

Anaphylaxis

The use of epinephrine for anaphylaxis by EMTs is already the established standard of care for wilderness emergencies. For many years, wilderness EMT programs have been advocating the use of epinephrine by WEMTs for anaphylaxis. This is because, when correctly used, the medication can be life-saving. As a result, the current revision of the national EMT-Basic curriculum now contains a section on administering epinephrine as a basic level skill[21].

It is important to note several things about the wilderness use of epinephrine. First, the epinephrine must be protected from light, heat, and freezing. Second, many people choose the *Epi-pen®*[22] as a delivery vehicle for the medication due to their trepidation for needles. While the spring-loaded syringe can be useful in these cases, there are multiple reports of the spring mechanism failing. Additionally, the device only delivers a single 0.3 mg dose. For these reasons, the traditional syringe model *Anakit®*, which can deliver two doses, is preferable.

In addition to epinephrine, antihistamines[23] are also indicated in anaphylaxis. They help limit symptoms, and can work to prevent a delayed second anaphylactic episode. They should be used in conjunction with the epinephrine when possible, and can be administered intravenously (IV), intramuscularly(IM), or by mouth(PO).

Finally, it should be noted that in an emergency, epinephrine can also be used for severe asthma. It is not the ideal choice[24] as it effects the cardiac and vascular systems as well as the respiratory system, and should not replace other therapies if they are available.

Asthma

Asthma exacerbations are common and the medications for their treatment in the wilderness can be critically important. Triggers include temperature variations, exercise, grass, tree, and pollen allergens. Metered-Dose Inhalers (MDI's) are the mainstay of both preventive and exacerbation management. There are numerous asthma medications available and an asthmatic may use several simultaneously. It is important to understand their benefits and limitations, as certain medications work very well as long-term preventive therapy but have *no role* in the treatment of acute episodes. For treatment of acute attacks, quick acting "Beta-2 agonists" such as *Albuterol*® provide the mainstay of care. When using the patient's own inhaler, always verify that it is a proper medication for acute management. In any case, correct use of the inhaler itself is critical. Several studies have shown that patients often don't know how to use an inhaler properly[25]. The use of a *spacer* is highly recommended as it facilitates medicine delivery and proper technique. Learning the proper use and instruction for an MDI can be a critical skill.

As mentioned earlier, in severe cases when other medications are not available, epinephrine can also be used at the 0.3 mg subcutaneous dose.

Infection

Antibiotics have multiple applications in the wilderness environment but are most likely to be used in an ALS system for open fractures. Trauma is the leading cause of wilderness emergencies. Note that open fractures are not always obvious with bone protruding on examination. *Any* presumed fracture with an open wound nearby should be considered an open fracture for treatment purposes. In addition, wounds that expose bone, but do not fracture it are also significant. The concern in either of these cases where bone is exposed to the environment is the chance for a bone infection to occur. The development of such an infection can be limb and/or life-threatening. The two most common bacteria involved are staph. aureus and staph. epidermis. Therefore antibiotics used for open fractures must be active against these organisms. There are many antibiotics that will work in this situation, but, since the goal is to get the antibiotics working as quickly as possible, IV or IM agents are preferred. Anyone with an open fracture will probably require a trip to the operating room, so PO medications are contraindicated for at least six hours prior to anesthesia. The particular choices used will depend on what is available locally per medical control.

Altitude Illnesses

When high altitudes (>8000ft) are an issue, it is prudent to include medications for illnesses such as High Altitude Cerebral Edema (HACE) and High Altitude Pulmonary Edema (HAPE). Medications including acetazolamide, steroids, diuretics, and calcium channel blockers are potentially helpful. It is critical, however, to recognize that the proper management of altitude disorders is descent; pharmaceutical interventions may only assist by helping to buy time to allow the descent.

Hypothermia

In cases of severe hypothermia (<90oF) there is an increased risk of cardiac arrhythmias including ventricular fibrillation. Precipitation of arrhythmias may be provoked by simple movements, complicating wilderness evacuation procedures. Agents that might guard against arrhythmias could be useful. Due to the altered physiology of hypothermic tissues and a poor understanding of pharmacology in hypothermic patients, most sources recommend avoiding standard ACLS cardiac medications. There is some evidence, although limited and conflicting, that suggests that in severely hypothermic patients *Bretylium*® may be the best antiarrhythmic agent. It *may* serve to increase the "Vfib threshold," making it less likely for the arrhythmia to occur. However, at this stage its use in prophylaxis against Vfib is still under investigation. The current preferred method to protect against Vfib in the wilderness environment is oxygenation, preferably by endotracheal tube[26].

Pain Control

When available, pain medications can play an important role in the management of wilderness emergencies. Most minor musculoskeletal injuries can be managed with the use of over-the-counter non-steroidal anti-inflammatory medications (NSAIDs) such as ibuprofen. It is important to note, however, that these agents can cause severe damage to the kidneys. There are several reports of kidney

failure occurring in previously healthy individuals after (significant) NSAID ingestion. An important factor in the safe use of NSAIDs is hydration. This is yet another reason for careful fluid management.

For moderate to severe pain management additional agents are required. Narcotics (e.g., morphine) remain the mainstay of pharmacological pain management strategies. Different agents with differing levels of potency are available, and choices can be tailored to local availability. Most may be administered IV, IM, or PO. For mild to moderate pain, oral *Tylenol* #3® (acetaminophen with codeine) works well. For more severe pain, however, a stronger narcotic that can be administered IV or IM is preferable. Be aware, too, that side effects such as nausea and sedation may occur. The simultaneous use of antihistamines can potentiate the effect of narcotics, and can also mediate some of the side effects. Be aware that narcotics can also depress respiratory function; therefore, the patient's breathing should be monitored carefully. Of course all narcotics can depress mental status. The concern over narcotic addiction is unwarranted when used properly for pain relief.

When narcotics are carried, a narcotic antagonist that can reverse their actions should also be available. Naloxolone (*Narcan*®) can reverse the effects of narcotics and can be used for accidental overdosing, or in cases where analgesia needs to be reversed to allow reexamination. Clearly the development of a Wilderness EMS System and physician cooperation is a mandatory prerequisite for the use of narcotics.

Sedatives and anxiolytics such as benzodiazepines may also be useful. They can help relieve patient anxiety and thereby facilitate rescue efforts. Low doses are recommended and care must be exercised to avoid an overdose.

Antiemetics

Along with narcotics, antiemetics can go a long way to increase the patient's comfort by reducing nausea and vomiting. They can be useful even when nausea and vomiting aren't part of the initial presentation. In fact, many patients develop motion sickness during an extrication. In cases of motion sickness-induced illnesses, antihistamines[27] work well if PO medications are tolerated. In more severe cases of nausea and vomiting, 25mg rectal suppositories of *Phenergan*® or *Compazine*® work well.

Other Agents

The medications carried should be tailored to the local conditions and the illnesses and injuries most likely to be encountered. Relatively benign over-the-counter medications such as antacids, decongestants, and antidiarrheal agents[28] can greatly increase patient comfort levels and are appropriate. These medications, while not included during normal EMT-Basic training, should be part of WEMT training.

Conclusion

It is clear that there is a role for ALS in the backcountry. The therapeutic advantages it can bring to the patient can be significant. Many severe complications and discomforts for the patient can potentially be reduced, or even eliminated, with the use of ALS techniques. The role is limited, however, and it will remain as a supplement to, and never replace, the BLS care every patient should receive. In addition, it requires a fairly sophisticated framework in which to function. This framework is the development of a sophisticated Wilderness EMS System. These systems require forethought, communication, and cooperation among the various people involved in organized rescues. While only a few systems currently exist where ALS techniques are routinely involved in wilderness rescues, a large number of areas already have the foundation for such a system to evolve.

[1]Emergency Medical Services
[2]EMT-Intermediates, Paramedics
[3]e.g., the Wilderness EMS Systems chapter of Auerbach's Wilderness and Environmental Medicine
[4]While today's communications capabilities have the potential to allow for direct on-site communication with a command physician, such real-time communication is not always necessary. It is more important that the care-providers work together *before* an incident to implement approaches to the wilderness patient. (e.g., protocols)
[5]Training for physicians in the art of wilderness medicine, and in the application of medical command techniques is increasing in availability and use. Such courses are available through the Wilderness Emergency Medical Services Institute.
[6]It not only helps guarantee a pathway for oxygen delivery, but also helps prevent aspiration of blood and vomitus.
[7]In the street the most common indication for intubation is cardiac arrest. In the wilderness environment, where the survival from arrest is essentially zero except for unusual circumstances (e.g., lightening injuries) treatment is generally not indicated.
[8]There is also the more unpleasant, but potentially life-saving, technique of using a safety pin (through the tongue) to hold the musculature forward and help keep the airway open.
[9]Signs suggesting a *tension* pneumothorax include 1)

severe respiratory distress, 2) profound hypotension /shock , and 3) *absent* breath sounds (tracheal deviation and jugular vein distension are later signs that are less useful).

[16]The debate over IV fluids in street EMS revolves around two issues: the delay in transport time (minutes) due to time used to initiate the IV and the limited amount of volume that can be infused over short transport times (again minutes). The scale of these debates (minutes) and the patient population to which they are addressed (critical trauma) eliminates their relevance to the wilderness environment.

[17]The mortality of patients who are in hypovolemic shock essentially doubles every thirty minutes of inadequate perfusion. Patients who suffer an immediately life-threatening hypovolemic episode in the wilderness are likely to be deceased by the time of arrival of trained personnel.

[12]e.g., an altered level of consciousness or the indication and/or likelihood for surgery within 6-8 hours [all open fractures, abdominal pain, etc....]

[13]Diabetic ketoacidosis occurs when there is too little insulin so that sugar builds up in the system, leading to *hyperglycemia*. The high circulating blood sugar levels lead to an "osmotic diuresis" where the patient's urine volume is dramatically increased. As a result, these patients are markedly dehydrated.

[14]Rhabdomyolysis refers to the breakdown of muscle tissue that occurs after a prolonged disruption of blood supply (such as can occur with crush injuries). These products of tissue breakdown can "clog" the kidneys and lead to eventual kidney failure (often taking 1-2 weeks). Aggressive hydration can help by essentially "flushing" the system and reducing the damage to the kidneys.

[15]ARDS can occur after a large systemic insult (e.g., major trauma). As part of the condition, the blood vessels become "leaky" and fluid can leave the vascular system and enter other tissues. This can lead to marked swelling of tissues - and a depletion of intravascular volume.

[18]Ask an orthopedic surgeon when they would like to have antibiotics started on an individual with an open fracture, and you will often hear the reply, "Thirty minutes *before* the injury occurred."

[7]Definitive nutrient replacement is not possible in the wilderness environment. However a certain minimal amount of calorie replacement can be reasonably provided by the addition of dextrose to the IV solutions. In fact, since all wilderness patients can reasonably be assumed to be glycogen-depleted, the addition of one to two ampules of D50 to each liter of IV fluid is a recommended routine.

[8]A full discussion of the merits and limitations of the various IV fluids for wilderness applications is not appropriate here. For most applications Normal Saline (NS) (or D5NS) solutions are adequate and the least expensive. Some of the more "exotic" and expensive fluids (e.g., hypertonic solutions and colloid solutions such as *Dextran®*) may have certain theoretical advantages in certain wilderness applications but are often limited in availability. Please note, however, that Lactated Ringers, an IV solution in common use pre-hospitally, contains lactate, a substance which can not be cannot be metabolized in severely hypothermic patients.

[9]An appendix in the Search and Rescue chapter of the P. Auerbach text, Wilderness and Environmental Medicine, contains a useful list of which drugs may be affected by common environmental conditions.

[10]This can be accomplished by the use of special transfusers, the use of a simple BP cuff, or the patient's own weight.

[11]The D.O.T. national EMT-B curriculum now allows EMT's to administer the patient's own epinephrine for anaphylaxis (it is not a medication currently carried on the ambulance).

[22]The *Epi-pen®* is a spring loaded delivery system for IM delivery of a single dose (0.3mg) of epinephrine.

[23]e.g., diphenhydramine (*Benadryl®*)

[24]In addition to being a bronchodilator, epinephrine has multiple cardiovascular effects.

[25]A description of the proper use of a Meter-Dose Inhaler (MDI) will not be covered here. But note that many patients either don't coordinate a breath in when they deliver the medicine, so it ends up on the back of their throat or in the air.

[26]Animal studies have not demonstrated an increased risk of precipitating arrhythmias by the act of intubation itself.

[27]The same antihistamines that are used for anaphylaxis (e.g., 25-50mg diphenhydramine (*Benadryl®*) can be used also for an anti-emetic.

[28]In some circles there has been concerns expressed over the use of anti-motility (antidiarrheal) agents such as *Loperamide®*. The concern has been over the theoretical harm that may result when, by stopping loose stools, the infectious agent remains in the gut and can do more harm. There has been no substantive evidence, however, to suggest that harm is actually done. And since diarrhea can be debilitating, its application can be justified.

About the Author: Matthew Russell is an WEMT, paramedic, and current member of the Upper Valley Wilderness Response Team (SAR) of Hanover, New Hampshire. An avid outdoors person with a special passion for whitewater kayaking, he has been involved with search and rescue for the past 8 years. Matt will graduate from Dartmouth Medical School in June with an M.D. degree and begin a residency in Emergency Medicine at the University of Pittsburgh Medical Center in Pittsburgh, Pennsylvania.

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group living skills. The waterfront coordinator will be a support person for counselors while also being responsible for implementing safe operating procedures for use in all water-related activities at camp (swimming, canoeing, river trips, etc.) Possible opportunity to get trained as lifeguard training instructor in order to train staff to be lifeguards. **QUAL:** Must be at least 19 years of age and certified in CPR, first aid, and lifeguarding. Looking for individuals who have experience with adolescents, with diverse populations, with ropes courses, or BA in related field. **BNFTS:** Extensive training, minimum of $1600 for nine weeks; full room and board. **AVAIL:** May 30 to August 10. **TO APPLY:** write or call:

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FOR THE RECOGNITION, TREATMENT, AND PREVENTION OF WILDERNESS EMERGENCIES

MAY/JUNE 1998 ISSN-1059-6518 VOLUME 9, NUMBER 3

THE CHARCOAL VEST:

A Hypothermia Treatment Device for Search and Rescue Teams

by Keith Conover, MD, FACEP

Find the Heat

For years, I have been searching for an effective hypothermia rewarming device for use in mountain and cave rescue – and I think I've finally found one that works well enough to satisfy me. It is the only field-portable device I've seen that actually delivers enough heat to rewarm someone in the field. This baby delivers 100 watts of power for 8 hours, has an overhead-cam V-8¼ oops, sorry, got carried away there. But it really does put out more heat than anything else I've carried in the field.

Fig. 1: The Heat-PacTM Charcoal Vest

It's officially called a HeatPac™ (HeatPac Personal Heater HPU 33400 to be precise), but a more generic term that's commonly used is "charcoal vest." The device has tubes that wrap around the chest, and it burns a charcoal briquet to make heat. The current design doesn't look much like a vest, but the earlier ones had wide flat "straps" that wrapped around the chest, so it used to look a bit more vest-like (a good imagination also helps). Actually, if you take a look at Figure 1, you may agree with me that it looks more like a cross between a cyber-punk military elephant and an olive-drab Portuguese man-of-war.

The device was developed by ITT for the Norwegian army, is marketed in Scandinavia by Alcatel STK, and is imported into the U.S. as well (see end of article for availability). Unfortunately, the civilian version of the device is distributed with a single-page instruction sheet that is quite skimpy, which is the main reason I'm writing this article. A good understanding of the device, its characteristics and its limitations will, I hope, make it more widely used in search and rescue operations.

My first exposure to the device was many years ago in the White Mountains of New Hampshire. An ice climber had fallen in Huntington Ravine, and was being carried out in a Stokes litter. The temperature was around zero Fahrenheit, and he had been thoroughly chilled if not actually hypothermic. But by the time he reached the road at Pinkham Notch, he'd demanded that the sleeping bag be opened because he was too hot from the charcoal vest!

The major theoretical problem with field-portable rewarming devices is the heat-to-weight ratio. Most devices – heat packs, inhalation rewarming devices, and the like – only produce a small amount of heat for their weight. Energy can be carried in the form of electricity in batteries – but even lightweight, high-energy lithium cells don't provide much heat per ounce. Energy can also be carried in the form of chemicals that dissolve in water and release heat (one type of heat pack), or in the form of a saturated salt solution that crystallizes and releases heat (another type of heat pack). Both of these types of heat packs deliver a lot of heat, but only for a short time, and they're pretty heavy. A third type of heat pack has powdered iron that oxidizes (burns) slowly, and is a lot lighter than the first two types of heat pack, but still doesn't produce a lot of heat for its weight.

Barring a portable cold-fusion device, the most effective device is going to be something that burns; oxidation provides a lot of heat from relatively light fuel. The iron-oxidation heat packs are good. But, when the iron powder "burns" the product is rust -- and iron and rust are relatively heavy "fuel" and "ash." It would be nice to have something lighter to burn.

The problem, of course, is that when most other materials burn, they produce not only heat but carbon dioxide and sometimes carbon monoxide. One way to get around the carbon monoxide problem is to use a catalyst to convert all the carbon monoxide to carbon dioxide. There are several types of charcoal-burning and gas-burning heaters on the market that use such catalysts – but none of them except the charcoal vest are suitable for rewarming a patient in a litter.

A Hot Design

The design of the charcoal vest is simple but elegant. The device contains, within its sturdy outer plastic shell, a roughly

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2"x4"x6" block of charcoal, encased in a metal shell, which burns at a rate controlled by the amount of air supplied to it. A fan blows air past the metal shell and out several tubes, which can be wrapped around the patient (these are the olive-drab "tentacles"in Figure 1). The fan also blows air into the burning charcoal inside the shell, and then out the exhaust tube (the black elephant-snout in Figure 1).

Over the Top

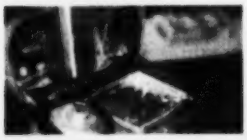

Fig. 2: Top view

The top opens to allow access to the battery and charcoal-box compartments (Figure 2). The hinge is sturdy, and the clasp that holds it closed is likewise of heavy-duty construction. From my cave rescue experience, I hesitate to say that any piece of engineering is cave-proof, but this design certainly looks highly cave-resistant. If you take out the charcoal box, and look deep within the compartment in which it sits, you'll see the catalyst grid there (Figure 3). The one-page instruction sheet notes that you can snag it out with a piece of hooked wire, and replace it as needed. However, it doesn't really tell you how to determine when it needs replacement.

Air Flow

The fan is driven by a single D-size alkaline cell. I suppose you could use a "regular" carbon-zinc cell, as it will be kept warm by the device, but the alkaline will last longer than a carbon-zinc even when kept warm. The battery has to be put in the correct way, or the air will blow through the unit backwards -- and the exhaust won't go through the catalyst, thus risking possible carbon monoxide production. A simple crossover diode circuit would prevent this problem and allow the battery to be inserted either way without risk of carbon monoxide production -- which would be a simple but important improvement to the device. Indeed, this was the one major reason why the HeatPac was given an unfavorable rating in one article in the medical literature. I think I may put the circuit into mine if can figure out one that works in really hot and really cold environments. There is a diagram on the outside of the compartment that indicates which way to insert the battery, but I feel that training users about the importance of battery polarity will be critical.

Fig. 3: Catalyst Grid at Bottom of Charcoal Compartment

The airflow within the device is fascinating. I took it down to my workbench and took it apart (a simple matter of removing a few screws) to see how it works. If you look at Figure 1, you can see the slits next to the charcoal box where air enters the device. Now look at Figure 5, where the device is opened up like a clamshell. The air is warmed as it passes along the sides of the charcoal box (A), before being drawn through a small slit into the fan itself. The next is a bit harder to imagine, but look carefully at the grey line I've drawn at the top left of Figure 5 (marked B). The warm air that is sucked past the

Fig. 4: Battery Compartment

charcoal box and into the fan comes out and is channeled in two directions. This top-left grey line indicates where the air exits into the "tentacles" to warm your patient. The second grey line © shows where some of the air is directed into the charcoal box, then through it, then through a metal spiral around the fan, and finally out the "snout" (the black exhaust tube). You may have to use a little imagination for this to make sense -- when the clamshell is folded back together, a little hole in the charcoal box fits (D) snugly up against a black rubber grommet (E) on the fan outflow box. If you also look at (F), you'll see a little piece of black plastic, which has a tiny black nubbin that sticks out through a curved hole in the case (G) and allows you to adjust the heat (see Figure 7 for an outside view of it).

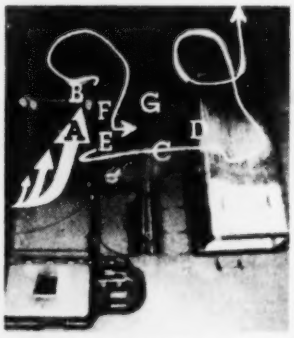

Fig. 5: HeatPac Air Flow

As you can see, some of the fan's air is directed out the tentacles, and some through the charcoal box to make heat. How does it know how much air to blow which way? I took the cover off the fan outflow box to see. Look at Figure 6, where I've exposed the "artificial intelligence" unit of this device. It consists of what seems to be a bimetallic strip and some cleverly-designed air channels. (A bimetallic strip is made of two different types of metal - when warmed, one expands more than the other, causing the strip to bend.) First, note the small slit where the air is drawn into the fan (H). Next, note the bimetallic strip (I); when cold, it's tightly curled up against the fan, directing all the air into the channel (J) leading to the charcoal box. When the device starts up, all the air goes through the charcoal box to get it burning -- which means rescuers should expect no heat out the "tentacles" for the first few minutes. Rescuers should also expect a fair bit of warmth and a bit of smoke coming out of the elephant-proboscis-exhaust for those first few minutes, though once the heater is running, little if any smoke and only a little warmth come out through its nose. After warming up, this strip uncurls and starts directing some warm air into the channels (K) leading to the "tentacles."

Pretty slick design, huh?

But now look carefully where my finger is pointing. There's a little metal strip here, too, that partially blocks the air going through the rubber grommet (L) into the charcoal box. I'm not entirely sure, but I suspect this is also a bimetallic strip -- it may serve as a "thermostat," cutting down the amount of air

Fig. 6: The Airflow Box "Artificial Intelligence"

entering the charcoal box when it gets very hot.

To make things even more complicated, there's this little black plastic piece right at my fingertip (M). This connects to the outside of the box (Figure 7) where it serves as a high-low lever -- by adjusting this up or down, you can increase or decrease the air going into the charcoal box, and increase or decrease the heat. Of course if you turn it up full blast, it won't run as long on a charcoal charge, but then, even at full blast (200 watts) it lasts for 6 hours (20 hours at 50 watts on low), and the charcoal charges are light, so you can easily carry a few extras.

A final interesting piece in this box -- you can't see it very well in Figure 6, but it's at (F) -- is something that turns off the fan when it gets too hot, a reasonable safety feature.

Practical Things

I said above that this device is reasonably cave-resistant (which means it's fine for almost any above-ground rescue), and it really doesn't need much if any protection -- it can just be stuffed into a cave pack. However, I've found that this isn't true of the charcoal elements -- though they are sealed in waterproof foil, this foil can easily be punctured, letting the charcoal get wet. And, the metal case around the charcoal can get so dented that you can't fit it into the charcoal vest.

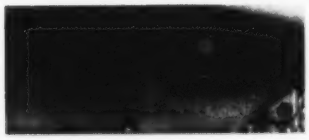

Fig. 7: Heat Adjustment Lever

There are two types of charcoal refills. The more expensive refills are prepackaged in an outer aluminum case, and have a fuse at one end, so that lighting them is easy. The cheaper kind is basically a brick of charcoal that you have to set on fire before inserting in a metal case, which can then be inserted in the charcoal vest proper. The cheaper version may be applicable for ice fishing or other leisurely pursuits, but for search and rescue teams the fused refills are worth the cost.

Each of the fused charcoal refills comes prepackaged with two matches and a small piece of match-striking paper at one end. Figure 8 shows the condition of one of these after being carried through a cave for a few hours. It's obviously best to put spare charcoal elements in a Pelican case or ammo box if you're taking them into a cave.

The prices in April 1997 when I ordered one were:

Fig. 8 Charcoal Refill After a Few Hours in a Cave

- HeatPac itself, including distribution tubes ("tentacles"): $299.95
- Charcoal heater elements (about 12 hours each):
- With fuse for lighting: 7/case, $69/case
- Charcoal Element Metal Cover: $20
- Without fuse: (requires above cover): 10/case, $63.33/case.

When I called Hawill's in April 1998, I found that a lot of people in cold places in tents and the like were ordering HeatPacs without the "tentacles" just to use as a no-electricity space heater, so that they're selling the distribution tubes separately. The prices were:

HeatPac alone:	$278.00
Split heater tubes (tentacles):	$74.95
Pile-lined soft case (maybe soon discontinued):	$23.80
Fused Fuel:	$99 for a case of 7
Nonfused Fuel:	$86 for a case of 10
Cover for above:	$21.65

Charcoal vests are available in the U.S. from:

Attn: Bill Tashjian
Hawill's, Ltd., P.O. Box 685, Westborough, MA 01581
(508) 366-7496 (508) 366-0211 (FAX)

Using the charcoal vest in a tent or cave presents certain risks -- if the battery is in the wrong way around, you could get dangerous carbon monoxide levels. And, even if you have the battery in the right way around, it still uses oxygen and produces carbon dioxide. So, I think I'd only use it in a cave or tent that has good air circulation.

I can remember two problems that cropped up when using this device on a mock cave rescue -- problems that prevented its use, but that can be easily overcome. First, rescuers started it up properly, but when after a minute there was a bit of smoke coming out the "nose" and no heat coming from the tentacles, they decided that it didn't work and quit using it. Secondly, when they lit it up and put it on the patient with the smoke still coming out the "nose," the patient started panicking and thrust it away. Starting the unit in a large passage with good airflow, and letting it warm up for about five minutes before introducing it to the patient, should prevent both these problems. Once it warms up, there's a slight burning smell, but virtually no visible smoke. The warmth of the device should make anyone who's cold snuggle right up to it. As with any warming device, though, you should not put the unit itself up against bare skin -- it might get a bit too warm and cause burns. Having the device itself strapped to the outside of the packaging over the patient' s chest, with the exhaust "nose" directed away from the patient's face, but the "tentacles" inside the packaging, seems to work quite well.

Training Points

If your SAR team is thinking about using one of these devices, please take the time to train your members in its use. Note the copyright: it's OK to print off a copy of this document and give to each member. But it is also important to fire it up in a meeting and let everyone play with it during the meeting. If team members are comfortable with it, they will be happy to fire it up and use it when needed -- and can avoid the two problems noted above. During the training, emphasize the following critical points:

1. Make sure the battery is in the right way! Or you may get carbon monoxide. Just like we recommend that riggers have a second member check critical rigging, always have a second team member check to see that the D cell "button" is sticking up as shown in Figure 2 before operating the device.

2. Expect a small amount of smoke and hot exhaust from the "nose" and no heat out the "tentacles" for the first 5-10 minutes.

3. Adjust the lever to produce the desired amount of heat.

Conclusion

Based on both warmth per unit weight and ease of use, and considering expense, dangers, and limitations, it is my opinion that the HeatPac is the best hypothermia rewarming device that a search and rescue team can get. I'd love to see a version with circuitry to allow battery insertion both ways, but I'm reasonably pleased with it the way it is. Until we have a cold-fusion-powered field-portable hot tub, or have a field-portable wrap-around radio wave rewarmer vest and can simply push the button for three minutes on high, this is the best we've got.

Reference

1 .Sterba JA. Efficacy and Safety of Prehospital Techniques to Treat Accidental Hypothermia. J Emerg Med 1991; 20:896-901.

Editor's Note: This article was reprinted with permission from Dr. Conover's website, www.pitt.edu/~kconover, where he welcomes visitors and feedback. Dr. Conover also hosts a wilderness-emergency-medicine Internet discussion group. For more information about the discussion group check www.wemsi.org.

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THEY'RE BACK... TICKING US OFF AS USUAL!

By Buck Tilton

Bob politely interrupted the class I was teaching on tick-borne illnesses, "Could this be what you're talking about?" he asked. Standing, he pulled up the leg of his shorts to reveal a well-defined reddish spot on his upper thigh, about three inches at its widest, and darker toward the outer edge.

"I've got a couple more," he said, and proceeded to expose those to the group of 30 Lander, Wyoming, students. "They've been getting bigger," he added.

Bob denied any knowledge of being tick bitten, but it looked like *erythema migrans* to me, the characteristic rash that first announces Lyme disease in somewhere between 60 and 80 percent of patients. The rash may develop where the tick bit, or anywhere else on the body, with a tendency to show up most often on thighs, groins, armpits, and sometimes behind the knee. After it first appears, the rash grows or "migrates." If *erythema migrans* emerges in the first week of the disease, it rarely grows to more than 2.5 inches across. Rashes appearing later-- two to four weeks later-- may reach eight inches across. The red "spot" typically feels warm, and perhaps causes a mild burning sensation to the patient, but seldom produces pain or itching.

Any more indications of illness, I wondered. "Something like the flu," Bob said, describing more of the early symptoms of Lyme disease: low-grade fever, headaches, unusual fatigue, and muscle aches. Untreated in the early stages, the disease may resolve spontaneously in about a month. Approximately one-half the patients, however, progress to serious problems including neurologic or cardiologic involvement, and, more commonly. Lyme arthritis which attacks large joints, especially the knee. Lyme disease has established itself as the leading vector-borne disease in the United States with almost 60,000 cases reported in the five years from 1990 to 1995. The warmer weather brought by El Niño promises to provide the U.S. in the next two years, especially the northeastern U.S., with the biggest and most voracious "crop" of Lyme-bearing ticks we have yet seen.

I voiced my concerns to Bob, and suggested a timely (in other words, immediate) visit to a physician. The physician took a blood sample and tested for the spirochetes, the corkscrew-shaped *Borrelia burgdorferi*, the bacteria that causes the most common tick-borne disease in the world. Bob was diagnosed: Lyme disease. The treatment was an antibiotic, amoxicillin, for four weeks. The cure was complete.

Unfortunately, more and more people are missing an early diagnosis, and presenting months, or even years, after the tick bite with the more severe symptoms of the disease: debilitating headaches, arthritis, neurological or cardiological abnormalities. Why the missed diagnosis? For one reason, says

David L. Weld, executive director of the American Lyme Disease Foundation, "many of the worst cases of Lyme disease were contracted a decade ago when people were not as aware of the illness." Other reasons: the early symptoms are sometimes mild enough to be ignored, the rash doesn't always appear, and the ticks often go unnoticed, typically attaching themselves during the nymph stage (late May, June, July) when they take up no more room on your skin than a poppy seed.

THE LIFE AND TIMES OF IXODES

To date the only confirmed species to pass the disease to humans are the Ixodes ticks: deer ticks in the East and Midwest (*Ixodes scapularis*, originally called *Ixodes dammini* in the Northeast), black-legged ticks in the West (*Ixodes pacificus*). As they feed on blood, infected ticks transmit the bacteria that produce the fever, headaches, fatigue, muscle aches, and, more often than not, the characteristic rash of Lyme disease.

After hatching from an egg in the spring of the year, these ticks progress through complex stages on their two-year journey to adulthood. The hatchlings become larvae that feed once in summer on the first red blood source that passes by (mammal, bird, or reptile), thereby picking up the spirochete if their meal is an infected deer mouse or other small mammal. Going dormant in fall and winter, the larvae molt into nymphs during their second spring, feeding several times their second summer, and transmitting the bacteria to humans-- if humans happen along. Later in the summer, the nymphs molt into adult ticks who mate in the fall after which the female lays her fertile eggs. Adult ticks can pass the Lyme disease bacteria but do so far less often. Being primarily active in early spring and late fall when people are less active outdoors, and being relatively large and easy to spot and remove, adult ticks have less chance to transmit *B. burgdorferi* to humans.

Lyme disease, first isolated and named in Lyme, Connecticut, in 1977, has grown most rapidly in the Northeast, upper Midwest, and northern California, with substantial growth in the South. So, you can relax on your intended trip to Europe or Asia, right? Wrong, says Weld. "You're at risk," he continued, "from a tick bite in all countries of the Northern Hemisphere!" A similar syndrome occurs in Australia. Although experts agree the disease has been with us since long before 1977, it was the evidence from the Connecticut outbreak that proved ticks as the vector.

"The strains of bacteria differ," added Weld, "but the signs and symptoms of the disease are essentially the same around the world. If you think you've got Lyme disease, see a physician as soon as possible." Early antibiotic treatment, according to Weld, prevents advanced problems in "98 percent of those who get Lyme disease."

WHAT ELSE IS THERE?

Ticks come in two basic sizes--tiny and hard to find, and big and easy to find. A relative of the spider, the tick crawls around on its unsuspecting host on eight tiny legs, looking for the right spot to settle down for a few days. It may search for hours. With specialized pincer like organs, it digs a small wound in his host. Into the wound goes a feeding apparatus called a hypostome, and its relatively powerful sucking mechanism allows the tick to feed on the blood of the host. Anchored firmly in the wound, it feeds for an average of two to five days, sometimes longer, depending on the species, and drops off weighing hundreds of times more than when it first arrived. In the host it often leaves a reminder of its visit, disease-causing microorganisms. Worldwide, only the mosquito spreads more illness than the tick.

Rocky Mountain Spotted Fever

Montana's Bitterroot Mountains first recorded Rocky Mountain spotted fever, caused by the parasite *Rickettsia rickettsii*, but it spread from coast to coast. After feeding for approximately three hours, infected ticks may pass the disease. Three to twelve days later, the patient develops a spotty rash, usually beginning on the hands, feet, wrists, and ankles. The spots migrate over the arms, legs, face, and abdomen. Severe headaches are common, with stiff neck and back, and general muscle aches. The characteristic fever rises during the first days, and remains high. If untreated, approximately 20 percent of the victims will die. Almost everyone will recover with antibiotic treatment.

Colorado Tick Fever

All the Rocky Mountain states have recorded patients with Colorado tick fever, as well as western Canada and South Dakota. A virus produces the sudden fever with muscle aches and headache that develops three to six days after the bite of the tick. Diarrhea, vomiting, and stomach aches are common signs and symptoms. The patient often recovers and relapses several times in the course of the illness. It is very rarely fatal, although sufferers report feeling so crummy they wish they could die.

Tularemia

Another bacteria, often borne by ticks of the South and Southwest, causes the high fever and flu-like symptoms of tularemia. A decaying wound at the site of the bite is common. Antibiotics will defeat the bacteria.

Tick Paralysis

At least 43 species of ticks, worldwide, have been known to cause tick paralysis, with more cases showing up in North America than anywhere else. A venom in tick saliva causes the problem, which appears to be a block to nerve messages, and children are affected more often than adults. The patient may first be restless and irritable with complaints of numbness or tingling in hands and feet. Ascending paralysis develops over the next 24 to 48 hours. Once the tick is removed, the patient

recovers, almost always without complications. Any patient with an ascending paralysis and without a known cause should be inspected carefully for an imbedded tick.

WHAT ABOUT PREVENTION?

If you spend time in woody, brushy, grassy areas during tick season (May - early September), especially if the areas are moist and shady, you run the risk of picking up one of the eight-legged hitchhikers. They habitually crawl around for a while, perhaps hours, "looking" for a tasty place to feed. Blind, or almost blind, all ticks spend the mobile parts of their lives going up. They crawl until bumping into a blade of grass, a bush, anything that provides access to a higher place. They'll wait at the tip of the grass or bush for a meal to pass by. Once on your body, ticks may not stop their meandering until they reach your scalp. Those who dig in along the way demonstrate a preference for dark, moist body areas such as behind the knee, the groin, around the waistline, under breasts, in armpits, and behind the ears. Once they settle down to eat, they bury their mouth parts in your skin and begin to drink your blood, a process they'll continue for days until they can hold no more, after which they drop off. In order to assimilate blood, ticks have to periodically "water down" the blood by salivating prior to swallowing. It's the ticks' saliva that contains most of the germs picked up by the "host." Since the salivation process passes more and more germs the longer the tick is attached, early removal often prevents the transmission of enough bacteria to cause illness.

Tick checks, several times a day, if you're active outdoors, are extremely important. If you wear light-colored clothing and tuck your pants into your socks, you stand a great chance of recognizing and removing the dark-colored tick before it reaches your skin. Once indoors, shower (which should remove loose ticks) and give yourself a close examination. Obviously, considering a tick's inclination to tuck itself into hard to see areas, a partner will add much to an adequate check. Free roaming ticks on your skin, if any remain, can be easily lifted off. Imbedded ticks should be immediately un-imbedded.

Quick tick removal is necessary to reduce the chance of disease transmission. Do not, the experts emphatically state, apply oil, petroleum jelly, heat, or anything else to remove the imbedded tick. With a pair of sharp-tipped tweezers, grasp the tick as close to your skin as possible. Slowly pull it straight out. A tiny piece of your skin may lift off with the tick. No problem. Avoid squeezing the tick which, says Weld, "is like squeezing a balloon full of water. The germ-laden contents of the tick are forced into your skin." After the tick is out, scrub the area gently with alcohol or an antibiotic ointment. Consider saving the tick in a small bottle or plastic bag with a blade of grass or leaf to provide moisture so the tiny body doesn't dry out. If you develop an illness, the tick can be turned into a lab in order to be tested for disease.

Researchers reporting in *The New England Journal of Medicine*, December 17, 1992, wrote: "When ticks were attached for less than 48 hours, *B. burgdorferi* was transmitted only rarely by infected nymphal-stage ticks and never by infected adult female ticks." On the other tick-infested hand, 83 percent of test animals were infected after a tick was attached for 72 hours, and 100 percent after a tick was allowed to feed to repletion (more than 120 hours).

What if your removal technique leaves tick mouth parts in your skin? If your pull is straight and slow, the mouth parts very rarely detach from the tick. And, even if they do, according to Weld, the chance of getting Lyme disease from just the mouth parts seems to be nonexistent.

Two repellents have proven effective in keeping ticks off:

DEET (diethyltoluamide), the active ingredient in most repellents, may be applied to skin. The Wilderness Medical Society, a physician-oriented group, state "A concentration of DEET no greater than 35 percent is recommended." (See Dr. Baughan's article "Bug Dope Revisited" in this issue.)

Permethrin, a spray repellent sold by Sawyer Products (800-940-4464), contains the active ingredient permethrin and may be applied to clothing. Although tests indicate permethrin does not harm skin, it doesn't work on skin. On clothing, however, it dries and actually kills ticks (and mosquitoes) on contact for up to two weeks. The long lasting effect of permethrin will allow you to treat your clothes prior to many trips and leave the spray can behind.

Editor's Note: There has been much publicity recently about a Lyme Disease vaccine from SmithKline Beecham which the FDA recommended for approval in late May. Even with an approval, it won't be a quick fix-- the immunization series which consists of three shots must be administered over a one-year period. The efficacy is claimed at 80% based on a pool of 10,936 volunteers between the ages of 15 to 70. The French are also seeking approval for a vaccine through Pasteur Meriex Connaugt. The data from the SmithKline study should be released soon-- stay tuned. Furthermore, there has been much hype about an increased concentration of ticks this summer. Rather than attribute this to El Niño, the CDC suggests these heightened numbers are due to the fact that the tick life-cycle is two years and even-numbered years (hence 1998) have historically seen more ticks. For more information and physician referrals, contact the American Lyme Disease Foundation at (914) 277-6970. The Centers for Disease Control can also be contacted at (970) 221-6400.

The Wilderness Medicine Newsletter is intended as an informational resource only. Neither the WMN or its staff can be held liable for the practical application of any of the ideas found herein. The staff encourages all readers to acquire as much certified training as possible and to consult their physicians for medical advice on personal health matters.

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BUG DOPE REVISITED

By David Baughan, MD

For anyone in the North Country who has spent five minutes outside in the past week, it is painfully evident that "They Are Here." I am referring to black flies, not tourists or aliens. Even though much has been written about insect repellents, some new information has come to light that I wanted to share since this will be a peak time for people to be buying and using various chemicals on their bodies.

This information concerns DEET (diethyltoluamide), the most common ingredient in commercial insect repellents. DEET has been around in public use since the 1950s. The manufacturer's claim to safety is that it has been used by millions of people annually for decades without apparent epidemics of diseases or death. Scattered reports appear periodically concerning seizures in children. The more we learn about the physical and chemical properties of DEET, though, the more cause for concern I find.

A little chemistry: a ring of six carbon atoms joined by double-bonds is called a benzene ring. Benzenes are very carcinogenic to animals and humans. Toluene is a variation on the benzene ring that is also toxic. DEET (diethyltoluamide) is a variation on a toluene ring. Now a variation on a variation does not equal a smoking gun for cancer, but it warrants careful attention. What happens when this is sprayed or rubbed on people? Sixty-percent is absorbed through the skin. It then is spread throughout the body by the circulatory system. It is readily stored in the body's fat stores, where it may be stored or slowly metabolized for a long period. It also can easily pass through what is called the "blood-brain barrier," meaning it gets into and can be stored in the brain. So, in addition to immediate reactions, there is concern for long-term effects that become harder to study. I hate to raise alarms without conclusive evidence, but if you wanted to find a frequently used chemical with potentially nasty properties, DEET would fit the bill. The Food and Drug Administration has recently taken the step of limiting the percent of DEET that can be in products marketed for use in children to 10%, which is getting low enough that black flies might consider it a seasoning rather than a repellent.

Another feature of DEET that makes me uncomfortable: spray it on plastic, spandex, or polyester sometime. Then watch the material deform or melt. I don't think I want that in my brain or liver!

What other choices do we have? Permethrins will be the major alternative, and some manufactures of repellents have already or will soon be offering permethrin products along with or instead of DEET. So read labels. Permethrins are derived from chrysanthemums, so there are no benzene rings to worry about. They do not penetrate the skin. In fact, one of their drawbacks is that they do not stick to skin well. But they stick to hair and clothes well. They also act as an insecticide, not just a repellent (they work great on ticks). The vapor from clothes or hair has an envelope of protection around the other parts of the body, although the effect may be insufficient at the beach or whenever a person is in a bathing suit. For campers, hikers, cyclists and other athletes who aren't naked, though, permethrins can have a prolonged effect. Permethrin powders can be added to the rinse cycle of clothes and last through up to six washings. Sprays can last on clothes or tents or sleeping bags for days. And they won't dissolve the tent.

Avon's Skin-So-Soft and citronella oils do have some effectiveness, but keep them handy. They need to be re-applied almost hourly to give protection.

So please enjoy the beautiful outdoors but consider the safety of the chemicals you use.

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Wilderness Medicine Newsletter
FOR THE RECOGNITION, TREATMENT, AND PREVENTION OF WILDERNESS EMERGENCIES

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INTERNATIONAL SOCIETY FOR MOUNTAIN MEDICINE CASE DISCUSSION

Introduction by Dr. Peter Bartsch, President

As president of the International Society for Mountain Medicine (ISMM), I am very grateful to the Wilderness Medicine Newsletter *for giving me the opportunity to introduce the ISMM to the readers of its newsletter.*

The ISMM is the only international society exclusively devoted to issues of medical practice and science in the mountains. It spans a very broad area covering practical medical problems of mountain rescue, diagnosis and management of high altitude illnesses and injuries, as well as research in all these areas. Today we have 500 members-- practitioners and researchers- from all over the world. As the society was started by physicians involved in rescue in the Alps, today we have 67% of our members in Western Europe, 21% in North America, 7% in Japan, and the remaining 5% from various countries around the world. At present much emphasis is put on increasing membership outside of Europe.

The major goal of ISMM is to provide information on practical and scientific issues related to mountain medicine, to encourage scientific discussion, and to promote research co-operations. These goals are achieved through publishing a quarterly newsletter and organizing or co-sponsoring international scientific meetings.

The newsletter of our society has developed to a most valuable and well-received source of information as it contains regular reviews of relevant topics on mountain medicine and physiology written by leading scientists and case discussions involving experts around the world. It also provides the members with a list of relevant new publications, book reviews, and valuable information about forthcoming meetings, research projects, and other matters of interest to our members who are encouraged to participate actively by presenting cases, or posing questions or stating opinions in letters to the editor.

In this issue of the Wilderness Medicine Newsletter, *you will find an example of a case discussion on "Altitude Exposure with Chronic Renal Failure" which was published in Volume 8, Number 3, July, 1998. Other topics of recent discussions were: "Traveling with an Infant to La Paz," "Participation in Expeditions after Severe Frostbite," and "Oral Contraceptives at High Altitude." Recent topics of review articles were: "Control of Ventilation in Hypoxia," "High Altitude-related Cough, and "Frostbite."*

Question: **A 45 year old hypertensive (treated) man with stable chronic renal failure (CRF) and well-controlled epilepsy wishes to travel on a 4-week remote trek in the Kangchenjunga region of Nepal. He has not told the trekking company about his medical history. There is a doctor accompanying the trek who has no previous experience of wilderness/high altitude medicine. The patient's general physician contacts you for advice-- what would you say?**

Brownie Schoene, USA
Cancel the trip and go to Hawaii instead.

Stephen Bezrushka, USA
As I always answer, it depends on the motivation of this man, how important it is for him to do this, and whether he accepts the unknown but increased risk of altitude, and difficulties getting help.

John Severinghaus, USA
I would like to know more: 1)How high the trekkers will go. 2)Is he on diuretics? 3)Does he have edema? 4)Is he acidotic or alkalotic? 5)Has he been at high altitude before and if so how did he fare?

The epilepsy probably is unimportant. Even if he seizes it is self limited and the doctor can presumably attend the minor effects, tongue biting, incontinence, etc.

That he hasn't told the trekking company doesn't say whether he chose not to or simply hadn't yet done so. If the former, he

should be advised not to go on these grounds alone. If he plans to tell them and ask their permission and counsel, then the referring physician will have the choice. If his renal failure creates edema, or alkalosis from Cl loss I would say don't go. If he has no edema and is normal or acidotic he can probably tolerate it. But if he has not tried altitude before, he should try it on Pikes Peak or some other place overnight first. A problem is if he gets into HAPE diuretics may not work well.

Buddha Basnyat, Nepal
I do not know if telling the trekking company will make a big difference. They will at the most say get an OK from his physician. Were his seizures brought on by CRF? If so then if his CRF is under control he can probably go on to high altitude as well controlled hypertension is not a contraindication for going to high altitude. However if his seizure was idiopathic I would like to know how long he has been seizure free. If seizure free for more than 2 years he is probably OK to go but he should be told that some people with a past history of seizure have seized in the mountains even after a long seizure free interval. I would tell him to stay away from seizure threshold lowering drugs like ciprofloxacin (commonly used for diarrhea in the mountains). I would make sure the treating physician knows about seizure management. If he has had more recent seizures like within a year or so I guess I would caution him about going although the data is not there to support me. If I were the patient I would also make sure and buy helicopter insurance for evacuation if necessary and register my name in my embassy in Nepal.

Eric Swenson, USA
I would advise against this man taking the trek. Without the details of his medical history or severity of his renal insufficiency, I lean to being very conservative. What concerns me is the potential for trouble if he becomes dehydrated, which is not a trivial problem (gastroenteritis, insufficient clean water, insufficient intake relative to normal losses (respiratory and cutaneous). Both dehydration and poor control of his blood pressure (the latter as a consequence of hypoxemia) could put his renal function at some risk. I haven't any idea of the consequences of hypoxemia on metabolism of his epileptic medication, but if it is a drug with a narrow therapeutic index, this may alter his otherwise well treated epilepsy. Fits and renal failure won't make for a pleasant sojourn in the hills.

James Milledge, UK
This 45 year old man has more than his fair share of problems but they are apparently all under drug control. Would altitude be expected to make any of his problems worse? Although the BP sometimes rises in healthy subjects, Halhuber et al. (1985) found that hypertension does not get worse at 3000m and there were no cases of heart failure or CVAs in almost a thousand patients. There may be a rise in pressure early in acclimatization with increase sympathetic drive and Hultgren advises that the pressure be checked and an increase in anti-hypertensive drugs given if indicated. I would be cautious in this, however, as postural hypotension is also common on arrival at altitude. As regards chronic stable renal failure I know of no evidence that altitude makes matters worse. Obviously dehydration must be avoided. Epilepsy, as far as we know, is also not made worse by altitude and Clarke found that well controlled patients are not at particular risk of seizures at altitude. So theoretically it should be all right for this patient to go on a trek assuming he is otherwise fit and can manage a good hill walking day at low altitude without trouble. However the combination of these three problems in one individual should make one pause. He should certainly discuss the problem with the trek doctor and trek leader and only go if they are happy with the responsibility. He should take a generous supply of medication with spare drugs and rescue drugs for epilepsy being carried by the doctor.

Halhuber, MJ, et al. (1995) Does altitude cause exhaustion of the heart and circulatory system?...in High Altitude Deterioration, Eds Rivolier, RJ et al. Karger, Basl, 192-202.

Peter Barry, UK
What is the general physician asking? There are many ways of looking at this question. Is the patient at risk of an exacerbation of one or more of his many problems if he goes on this trek? Quite clearly, he could develop an intercurrent gastrointestinal disturbance and become dehydrated, compromising his renal function and precipitating acute chronic renal failure. He could stop absorbing or be unable to take his anti-convulsants and have a seizure. Presumably hypoxia would lower his seizure threshold? Is there any evidence for this? Is there an effect per se of raised intercranial pressure and pre-existing epilepsy?

Should the patient tell the trekking company? Yes. The patient potentially endangers himself and his fellow travelers. These risks may be acceptable, but the participants should be able to make some sort of informed decision as to whether they take part. Should the physician tell the trekking company if the patient won't? This is more difficult. Can I just pose the question and then duck it? Should the doctor accompanying the trek have some previous experience or at least training in wilderness/high altitude medicine? Yes, and should the ISMM be laying down standards for medical cover for such treks? {Personally I think not, but what do others think? There, more questions that answers, I am afraid, but as Brownie said, Hawaii looks like a much more attractive option, both from the patient's point of view and that of the trekking company (at least he can drive down to sea level!).

Charles Houston, USA
The man with hypertension and chronic renal failure and epilepsy has three strikes against him and should not go to a remote place anywhere, least of all the Himalayas. Epilepsy is probably not affected by altitude, but the other problems pose too great a risk. No one should go on (or be accepted for) a trek to a remote altitude area without full disclosure of medical history. And in general a doctor for such a trip should have some understanding about high altitude.

David Murdoch, New Zealand
In many ways this is an issue of risk perception. Is the perceived risk associated with the proposed journey acceptable or not?

The person in question clearly perceives the risk to himself as acceptable, otherwise he would not be planning the journey. None of the medical conditions mentioned are absolute contraindications to remote high altitude travel (assuming he is not dialysis-dependent). Therefore, on an individual level, I would find it difficult to tell him to cancel his trip outright. I would, however, be very up-front with any concerns regarding maintenance of adequate hydration, the added risks of intercurrent illnesses on renal function and epilepsy control, the potential hazards to himself and others if he does become unwell, and the difficulties managing such problems in a wilderness setting.

This scenario is complicated by his intention to travel with an organized group. He now has some unwilling partners in his risk-taking. Consequently, the decision whether the perceived risk of traveling with this person is tolerable or not needs to be made at a group level (probably through the trekking company or expedition doctor). There is no doubt that he should disclose his medical history to the accompanying doctor and his general physician should encourage this. Many trekking companies would be very reluctant to take on this person despite the fact that many people with similar medical histories have safely undertaken such treks. However, it is well within their rights to do so.

This issue is complex and has few (if any) absolutes. If this man is determined to undertake the journey, perhaps the best we can do is to suggest he organize a trek with some willing acquaintances and a flexible itinerary, provide him with the best available information on the risks, and encourage him to get good medical insurance! Do we know the cause of the 45 year old's renal failure?

Tom Hornbein, USA
Wouldn't touch him with a 10 foot pole. That he hasn't told the trek company is an early warning that he's bad news, putting the whole trek at risk. If he wants to hire a guide on his own, that's his business, and risks are obviously greater for him than others, but risk is what the game's all about anyway.

Simon Gibbs, UK
The patient is irresponsible if he has misled the tour company. The fluid shifts encountered on the trek may lead to loss of control of his hypertension and epilepsy and destabilization of his renal failure. I would like more clinical details before I strongly advised against the trek but his medical conditions do not bode well. I am sure he is a good example of why the morbidity of trekking with a tour company has become significant

Gustavo Zubieta (Sr.), Bolivia
With this kind of disease, I do not recommend that he goes trekking. I would not recommend that anyone go to the top of Mount Everest, unless he wants to demonstrate how a human being can tolerate an environment. If such is the case then I would say, go ahead at your own risk.

Gustavo Zubieta (Jr.), Bolivia
Definitely not recommended. One thing is a pleasure trip (that often has complications, even for healthy people) and another an absolute necessity. Here in La Paz (3100-4100 m) we have people coming or living with all kinds of disease, but they have no other choice (work, family ties, home, etc.). Furthermore, this is also a city with all kinds of medical knowledge and facilities, if necessary. This question, brings to my mind a story of a man that went trekking and fell into deep coma. He was evacuated by helicopter, and ambulance-plane and when he recovered at his home hospital asked: "Why did you bring me back? It was my choice to die there."

Gerald Dubowitz, Pheriche, Nepal
Easy, don't go.

Worsening of renal associated problems are a problem in this environment which may upset his "stable" position. The epilepsy is not a contraindication to mountain travel per se especially if well controlled.

The remoteness is perhaps more of a worry than the high altitude trekking. I would suggest a less remote trek, a good insurance police, and a suggestion to consider alternative venues/pursuits (skydiving?).

Andy Pollard, UK
Even with the limited medical information we have here, it is clear that this individual is at risk of serious complications of his chronic illness during a remote trek. If he is fully informed about the potential dangers and the difficulties in managing complications (because of the absence of immediate medical facilities) he should be free to make his own decisions about taking such risks. The real problem here is the effect that this man's chronic illnesses are likely to have on his companions who may be inconvenienced and even put in danger should he require evacuation on medical grounds. Should he develop problems during the trek, there could be legal implications for his own physician, the trek doctor, of even the trekking company if he is not carefully advised. If he remains adamant that he wants to go he should be persuaded not to go with a commercial trek but to make private arrangements and to ensure that he has adequate insurance for evacuation.

The other major activity of the ISMM is to participate in organizing meetings such as the Biannual World Congress in High Altitude Medicine. Recent congresses were held in La Paz, Bolivia; Cuzco, Peru: and Matsumoto, Japan. ISMM participated in the Second World Congress on Wilderness Medicine in Aspen, 1995 and is a co-sponsor of the

International Hypoxia Meetings at Lake Louise. To further promote research in mountain medicine, the ISMM will award a scientific prize at the 11th International Hypoxia Meeting held in Jasper, Canada, in February, 1999. Deadline for submission is September 30, 1998. Further details are published in the ISMM newsletter.

ISMM would be very happy to welcome new members from those of the Wilderness Medicine Newsletter *who have a particular interest in mountain medicine. Annual membership fee is $40 US for regular members, $30 US for residents, and $25 US for students. Applications should be sent to:*

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A SUMMER REVIEW OF HEAT ILLNESSES

By Rebecca S. Newton, W-EMT

During the summer of 1995, headlines across the United States spoke of doomed Midwesterners in Illinois, Missouri, and Wisconsin; in July of that year, the death toll due to the heat wave broke 700 in Chicago alone. In 1996, when the Olympic Games came to Atlanta, event medical teams were ready to implement the efforts of many months of planning to cope with the health problems that athletes were expected to encounter during the scorching southern summer. In 1997, record-high temperatures in Orange County, California, began in March and didn't abate until well into August. This spring, the temperature hit 100 in Dallas on May 31st, and the extreme weather was implicated in the death of a 23-year-old bicyclist a few days later. At the time of this article, Texas continues to break the records on high temperatures and corresponding death tolls.

Humans function best within a narrow temperature range. Although media attention has been heaped upon the past few years' hot-weather maladies - and although every natural occurrence in 1998 seems to be the fault of El Nino, if you believe recent reports - heat illness is nothing new.

One of the body's most delicate balances is that between the water it takes in from the environment and the water it produces as waste. This balance makes crucial contributions to the thermoregulatory system. The body relies upon its circulatory system to transport materials internally, cooling fluids as they travel away from the core and through the extremities. The body also relies upon sweating's evaporative cooling to keep it functioning when ambient temperatures rise. The defenses offered by the sweating mechanism may be lost, however, as a result of external factors, such as the heat and humidity of the environment, or as a result of internal factors, such as a predisposing medical problem.

Effective sweating relies upon a difference between the humidity level just above the skin and that of the surrounding air, and upon convection of the air to carry away moisture removed from the skin. A reproduction of this mechanism is what you create when you splash water from your water bottle on yourself while coasting down a hill on a bicycle or while standing on a breezy mountaintop. Sweating loses efficiency in humid weather; water is not transferred from the body to the surrounding air when the environment surrounding the body is already saturated with water, especially if the air is calm and convective effects are decreased.

Even heat without humidity makes thermoregulation a challenge. In accordance with basic thermodynamics, heat transfer occurs between an object and its environment when the two are at different temperatures; heat always moves from hotter to cooler. The human body maintains itself at approximately 98.6 F (37 C). When the ambient temperature creeps into the 90s, approaching the body's own thermal set-point, the body has an increasingly difficult time ridding itself of excess heat.

When the body is overwhelmed either by heat produced by its own activity or by heat absorbed from the surrounding environment, its cooling mechanisms can fail even under conditions of moderate heat and humidity. The very old, the very young, and anyone without good general health are most susceptible to heat illness. Those too poor to afford effective air-conditioning and cooling systems, particularly in urban environments, also tend to be hard-hit by hot weather. Medical conditions that put a person at risk include diabetes, high blood pressure, hyperthyroidism, heart disease, anorexia nervosa, bulimia, parkisonism, scleroderma, burn scarring, obesity, and fever. Certain drugs - including anticholinergics, antidepressants, antihistamines, amphetamines, diuretics, phenothiazines, psychotropics, and even alcohol - can also increase vulnerability to heat illnesses. However, such simple factors as fatigue, lack of acclimatization to heat, a history of heat illness, or a recent bout of vomiting or diarrhea (causing significant fluid loss) may predispose even healthy outdoors-people to problems.

Indeed, heat illness is a common backcountry ailment. Drinking-quality water is hard to come by in the woods, and water sources can be unreliable, especially in hot summer months when they're needed most. Carrying enough water, even

for a short dayhike, makes a heavier pack than some wanderers are willing to tolerate.

Backcountry travellers may be all the more vulnerable since they tend to be in good shape and are often under the mistaken impression that this will protect them from heat illness. To the contrary, a tendency to challenge boundaries and to push limits of physical comfort-part of the appeal of backcountry travel itself - is what gets so many outdoorspeople into trouble.

Although acclimatizing oneself with gradual exposure to increasing exertion in hot weather does help prevent heat illness, acclimatization is not immunity. Anyone travelling under his or her own power stands to lose large volumes of body fluid to sweat. An excessive loss of fluid without replacement will endanger even the best-conditioned athlete. In fact, an individual who is acclimatized generally begins sweating more easily than an unacclimatized individual, and may generate more than twice as much perspiration during the same activity. This quick and effective response indicates increased fitness of the acclimatized person's cooling system. But when the water is difficult to replace, such an adaptation is a mixed blessing.

Furthermore, thirst is not a reliable gauge of how much water one should take in. By the time thirst is noticed, chances are the body has already fallen at least one liter short of adequate hydration; and the thirst mechanism may shut off when as little as two percent of the needed fluid has been replaced. A loss of three to four liters can cause serious impairment, including a fifty percent decrease in endurance and a twenty-five percent reduction of maximum oxygen uptake. The real danger zone for imminent heat illness hovers around a ten percent loss of body weight, which for the average 70-kg person represents about seven liters of fluid.

But the body faces danger well before seven liters' loss. As heat stress begins to overload protective cooling mechanisms, even mild dehydration can predispose an active person to heat cramps, heat exhaustion, or heat stroke.

Heat Cramps

Heat cramps are pains in fatigued muscles - often in the abdomen or extremities - that begin during or even several hours after exercise in hot weather. Caused by a loss of fluids and electrolytes (primarily sodium, potassium, and magnesium), they can be prevented by keeping well-hydrated, acclimatizing gradually to strenuous exercise in hot weather, avoiding overdressing against the cold, stretching well before exertion, and eating foods rich in potassium (such as bananas) and other essential ions. Treatment entails replacing what was lost and restoring comfort to the patient. Replace lost fluid and salt with a mixture of 1 teaspoon salt per 1 quart water. (Sugar or drink mix helps to cut the salty taste of the water.) To soothe cramped muscles, rest with legs elevated and stretch well. Avoid massage, which is likely to contribute to later soreness. Heat cramps only require medical attention when they occur in people who have heart problems or who follow a low-sodium diet.

Heat Exhaustion

Heat exhaustion often begins with thirst and a headache. The signs and symptoms of heat exhaustion are similar to those that indicate shock: lethargy, fatigue, slight tachycardia, tachypnea, nausea, vomiting, dizziness, pale skin, diaphoresis, confusion. Like shock, heat exhaustion can be precipitated by a loss in the body's fluid volume (in this case, due to dehydration) or by vasodilation (again, as a physiologic response to dehydration or as an attempt to cool the body), or, more commonly, by a combination of both these factors.

Although heat exhaustion is not life-threatening in itself, it should be treated quickly and aggressively to avoid complications, including possible progression to heat stroke. Get to a cool place. Seek shade if available. Remove any excess clothing and apply cool cloths to the body, such as a damp bandanna on the forehead. Monitor body temperature. Again, replace lost fluids and electrolytes as much as possible. If fluid loss is severe, if vomiting occurs, or if the patient does not improve markedly with treatment, seek medical attention. Never give alcohol, cigarettes, caffeinated drinks, or other stimulants to any patient with even the mildest heat illness. After about 24 hours, most victims of heat exhaustion should recover, and can then resume activity cautiously.

Heat Stroke

Heat stroke, also known as sunstroke, is a truly life-threatening emergency. It can cause permanent disability and organ damage, and will progress to coma and death without immediate care. Its cause is "oversweating" - the body's sweating mechanism fails under stress, and body temperature rises rapidly. Heat exhaustion may progress to heat stroke, or heat stroke may arise independently. Its early signs and symptoms may mimic heat exhaustion. The difference between the two problems, however, is that heat stroke patients exhibit notably altered brain function. Remember that a change in level of consciousness means that patients with heat stroke are not self-aware enough to help themselves, often because they will not realize what is happening. If you observe hallucinations, combativeness, agitation, seizures, or any other sign of severely altered level of consciousness in a heat-affected patient, think of heat stroke and act quickly.

The classical picture of heat stroke is often seen in elderly patients whose residences are inadequately cooled during hot urban summers; it typically has a slow onset and the patient presents with skin that is red, hot, and dry. More common in people of all ages working and playing outdoors is exertional heat stroke, which is typically quick-onset with skin that is red, hot, and sweaty.

Treatment for either case is the same, and must be initiated immediately. Remove the patient from heat and sun. Cool by

soaking with water and fanning to accelerate evaporation. However, be cautious not to cool so aggressively that the patient begins to shiver, because shivering will produce heat that will counteract your treatment. Never apply ice directly to the body, for risk of causing localized frostbite. If muscle spasms begin or the patient starts to convulse, do not place anything in the mouth. If vomiting occurs, keep the patient on his side to avoid aspiration. Vigorously massage limbs to help move the extremities' cooler blood to the body's core and to bring the core's warmer blood out for cooling. Get the patient to a hospital as soon as possible.

Prevention is Still the Best Treatment

The key to every one of these problems is to treat it before it arises-- or, as a second-best, to halt it before it progresses. Common sense and self-awareness go a long way toward preventing heat illness. Acclimatize yourself to warm weather by building up your exertion level slowly; admit your limits, and respect them. Wear lightweight, light-colored clothes and keep your head shaded from direct sunlight with a light-colored cap. Use extra caution if you exercise outdoors when the temperature is above 90 F or the humidity is above 70 percent.

Staying healthy, well-rested, and well-hydrated is the best defense against heat illnesses. Despite the recent flood of brightly-colored and enthusiastically-endorsed products on to the sports-drink market, water remains the best "fluid replacement" alternative. Concentrated sports drinks can even sabotage their own aims by drawing water into the stomach--and, hence, away from the rest of the body - in an effort to dilute themselves. (At the very least, if you do choose these drinks, dilute them with water to save your body the work.) Try to drink at least two liters of water per day even when you're not especially active. Keep in mind that the body can lose upwards of one liter each hour during strenuous exercise. It's hard to replace fluids at that rate, especially when you're hiking or biking or boating far from home. When weather is hot, stop often to rest and snack.

If you're a backcountry trip leader, whether you're a hired guide or just the most experienced among a group of friends, you have added responsibility to prevent heat illness. You must keep yourself in good condition to make sound decisions for the group; your fellow travellers are trusting your ability to help guide them safely. Watch for lapses in judgement that can signal the onset of a problem. As a leader, you can set a good example by breaking early and often for quick snack and water breaks. By doing so, you will help remove any stigma that novices travelling with you may feel about holding up the group.

No matter how, when, or with whom you're travelling, set the tone early in the trip: keeping fed and hydrated is not a distraction or a luxury, but a necessity for safe and enjoyable backcountry travel.

REFERENCES:

* Auerbach, Paul S., ed. *Wilderness Medicine: Management of Wilderness and Environmental Emergencies, 3rd Edition*. St. Louis: Mosby-Year Book, 1995.

* "Death reported from heat wave but injuries are fewer than in July." *St. Louis Post-Dispatch*, 19 August 1995.

* Hubbell, Frank, and Buck S. Tilton. *The Wilderness First Responder*. Old Saybrook: The Globe Pequot Press, 1998.

* Merck Manual Web site: http://www.merck.com

* "O.C. temperatures break record, tax tempers." *Los Angeles Times* (OrangeCounty Edition), 6 August 1997.

* "Officials issue heat warnings: Extreme weather suspected in death of bicyclist, 23." *The Dallas Morning News*, 2 June 1998.

* "Olympic Weekly: Health: ACOG medical teams are making plans in case temperatures soar during the Games." *The Atlanta Journal and Constitution*, 4 August 1995.

* Postgraduate Medicine Online: http://www.postgradmed.com

* Semenza JC, Rubin CH, Falter KH, et al. "Heat-related deaths during the July 1995 heat wave in Chicago." *New England Journal of Medicine*, 1996; 335(2): 84-90.

HYPERVENTILATION ISSUES

By Buck Tilton

Not a disease, hyperventilation -- breathing unusually quickly and/or deeply-- is a human response to some type of stress to the body, such as illness, emotion, exercise, pain, a sudden dip in icy water, etc. To treat hyperventilation, therefore, you have to assess and treat the cause.

First and foremost in the assessment of a hyperventilating patient is determining if there are any immediate threats to life, a result of the initial survey. Finding none, you should move to the focused assessment, which may shed light on why the patient is breathing fast. A cause discovered and treated should reduce the hyperventilatory response.

HYPERVENTILATION SYNDROME, here defined as breathing rapidly without another cause, occurs relatively often in otherwise healthy patients as a result of psychological stress. The patient, like most hyperventilating patients, will

have a high level of anxiety or panic. Rapid breathing blows off carbon dioxide, altering the pH of blood (raising it) a condition called respiratory alkalosis. Alkalosis may produce numbness and tingling in the mouth, fingers, and toes. Alkalosis may also induce carpopedal spasms, muscular spasms in the hands and feet Rapid breathing may cause the slow onset of chest pain from overtaxed chest muscles. Lightheadedness and dizziness are not uncommon. Skin color may vary from pale to flushed. These physiological responses to hyperventilation do nothing to calm the psychologically stressed patient. Prolonged hyperventilation will cause constriction of the blood vessels in the brain, which may lead to fainting. Consciousness will return when the patient's carbon dioxide level returns to normal.

As soon as you know the patient's life is not threatened, you should begin to help the patient regain control of breathing. Simple tips for you to follow include:

- Stay calm.
- Clear the immediate area of other people.
- State clearly to the patient that he or she feels terrible because of fast breathing.
- Ask the patient to breathe slower.
- Ask the patient to hold his/her breath for three seconds or longer if possible, while you do the counting.
- Ask the patient to breathe through the nose.
- Ask the patient to breathe along with you in a slow, calm manner.
- Be supportive in your attitudes and words.
- Do not ask the patient to breathe into a bag. It does not work faster than calming the patient down. It may cause more anxiety for the patient.

When the patient returns to normal breathing, and the signs and symptoms go away, recovery is complete.

programs

ALEUTIAN SEA KAYAK PROGRAM

By Ted Walsh

When some members of the SOLO staff started to build sea kayaks for their own use five years ago, a number of SOLO students had an opportunity to see these unique boats in different stages of construction. The result was an often repeated question, "Do you think you would ever offer a sea kayak-building course?" Out of this interest came the SOLO A.S.K. program.

What we build and share with our students is a design that marries traditional construction with the best modern boat-building techniques. As with the originals, the frames of the boats are constructed of wood using classic techniques such as lashed and mortise joinery and bone ball joints. The skin, however, though hand-stitched, is nylon treated with hypalon.

Based on the IQYAX-type, the boats are of the BAIDARKA family and measure approximately 18' long and 22"-23" wide. During the course each student builds his or her own boat; as a result each boat is customized to each paddler.

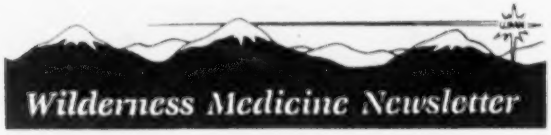
Like all courses at SOLO, the emphasis is on "open learning opportunities." While clearly the core of the curriculum is kayak construction and design, there are a number of opportunities throughout the course to explore other aspects relating to kayaks, ranging from studying kayak safety to creating Aleutian bent-wood hats. Due to past students' input and interests, topics like weather, small craft navigation, coastal habitats, and paddle, clothing, and gearbag design and construction have been included in the course.

Each student is encouraged to work at his or her own pace. Avoiding inflexible formulas, we teach skills based on general principles of craft that can be modified to fit specific situations. Our goal is for students to leave with the skills and confidence not only to build other kayaks on their own but also try a number of other projects.

Course length can be tailored to time constraints of students. In general, there are two programs. The month-long course enables participants to build and complete the basic kayak, leaving final coats of paint and some minor finishing details to be done by the student on his or her own after the course. The six-week course allows for complete finishing of individual boats and includes more time for customizing and developing individual gear.

The cost for the month-long program is $2800; cost for the six-week course is $3200. The cost includes: room and board (minus meals on weekends), instructional fees, and all materials for your boat. Tuition does not cover kayak-related gear such as storage bags, life jackets, paddles, and pumps.

Course dates are determined every six months. The next program is slated for September 7 - October 17, 1998. For more information, call SOLO's main office at (603) 447-6711 and ask for the ORCA Department.



WILDERNESS FIRST AID & MEDICAL TRAINING OPTIONS

SOLO
PO Box 3150, Conway, New Hampshire 03818
Telephone: (603) 447-6711, Mon-Fri 9am-4pm

Advanced Leadership & Emergency Care (ALEC)...A combination of WFR, NREMT, WEMT and wilderness leadership skills, survival, rescue and more, this is ideal for the professional outdoor leader.
Oct. 5 - Nov. 13 Conway, NH (603-447-6711)

Wilderness EMT
Sept. 12 - Oct. 2 Conway, NH (603-447-6711)
Nov. 15 - Dec. 11 Conway, NH (603-447-6711)
Dec. 29 - Jan. 22, 1999 Conway, NH (603-447-6711)

Wilderness First Responder
Sept. 14-22 Outward Bnd, MD (800-341-1744)
Oct. 1-9 Outward Bound, ME (800-341-1744)
Oct. 19-30 AMC, NH (603-466-2727)
Oct. 26 - Nov. 5 Blairstown, NJ (908-362-5670)
Dec. 1-11 Hulbert Outdoor, VT (802-333-3405)

Wilderness First Aid/WFR Recertification
Sept. 5-6 AMC Gorham, NH (603-466-2727)
Sept. 12-13 NOLS, MA (617-859-4312)
Sept. 25-27 AMC Gorham, NH (603-466-2727)
Sept. 25-27 Middlebury, VT (802-443-5000 x 5264)
Sept. 26-27 AMC, MA (617-923-4595)
Oct. 3-4 AMC Worcester, MA (508-485-7379)
Oct. 24-25 AMC Gorham, NH (603-466-2727)
Oct. 31 - Nov. 11 Mohican Out, NJ (908-362-5670)

Wilderness/Rural EMT Module
Nov. 8-12 AMC, NH (603-466-2727)
Dec. 12-16 SOLO, NH (603-447-6711)

EMT/Wilderness EMT RTP
Oct. 2-5 SOLO, NH (603-447-6711)
Dec. 17-19, 21 SOLO, NH (603-447-6711)
Jan. 26-29 SOLO, NH (603-447-6711)

The Essential Box
Nov. 14-16 Conway, NH (603-447-6711)

Wilderness First Responder Review
Sept.12-13 Outward Bound, MD (800-341-1744)
Oct. 10-11 Outward Bound, MD (800-341-1744)

Wilderness EMT Part 2
Aug. 24 - Sept. 4 Conway, NH (603-447-6711)
Sept. 21 - Oct. 2 Conway, NH (603-447-6711)
Nov. 2-13 Conway, NH (603-447-6711)
Nov. 30 - Dec. 11 Conway, NH (603-447-6711)

NORTH AMERICAN RESCUE INSTITUTE
PO Box 3150, Conway, New Hampshire 03818
Telephone: (603) 447-6711 Mon-Fri 9am-4pm

Search & Rescue
Nov. 21-22 Hulbert Outdoor, VT (802-333-3405)

High Angle Rescue (Level 1)
Sept. 26-27 Conway, NH (603-447-6711)

High Angle Rescue (Level 2)
Oct. 2-4 Conway, NH (603-447-6711)

First 5 Minutes for School Bus Drivers
Aug. 1-2 Conway, NH (603-447-6711)

Flat Water Rescue Operations
Aug. 8-9 Conway, NH (603-447-6711)

Winter Survival
Dec. 5-6 AMC, NH (603-447-6711)

WILDERNESS MEDICINE INSTITUTE
PO Box 9, Pitkin, Colorado 81241
Telephone: (970) 641-3572, Mon-Thurs 9am-1pm

Wilderness EMT
Nov. 23 - Dec. 18 Kelly, WY (307-733-4765)
Jan. 4 - 29 Pitkin, CO (970-641-3572)
Mar. 15 - Apr. 9 Oakhurst, CA (970-641-3572)

Wilderness First Responder
Oct. 9-18 Bend, OR (970-641-3572)
Oct. 24 - Nov. 3 (970-641-3572)
Nov. 30 - Dec. 10 (307-733-4765)

Wilderness First Aid/WFR Recertification
Sept. 12-13 Cody, WY (307-587-9517)
Oct. 3-4 Ashland, OR (541-488-1202)
Oct. 19-20 Walton Beach, FL (970-641-3572)

The Wilderness Medicine Newsletter is intended as an informational resource only. Neither the WMN or its staff can be held liable for the practical application of any of the ideas found herein. The staff encourages all readers to acquire as much certified training as possible and to consult their physicians for medical advice on personal health matters.

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Wilderness Medicine Newsletter
FOR THE RECOGNITION, TREATMENT, AND PREVENTION OF WILDERNESS EMERGENCIES

SEPTEMBER/OCTOBER 1998 ISSN-1059-6518 VOLUME 9, NUMBER 5 NUMBER

WHAT'S YOUR POSITION?

GPS Makes Friends and Foe

by Jeanne Twehous, WEMT

I give in. Technology is in the backcountry to stay. Who hasn't heard about or even met overdue hikers calling in late for dinner, or novice bushwhackers toting Global Positioning System (GPS) units they don't know how to use? I'd rather leave technology in the office, but, I realized recently, if I was to remain useful in my field of wilderness medicine and leadership, I would need to rise above my techno-bigotry.

I must admit, I was excited when the box marked Magellan arrived at the post. I unwrapped the shiny XL4000 loaner with haste; I couldn't wait to get started.

But wait I did, and I learned rather quickly that a GPS unit is not a "take-it out-of-the-box-and-I'll-read-the-instructions-later" kind of tool. The best I could do after 20 minutes of fiddling was determine, definitely, that my unit wasn't locking onto a satellite's signals.

GPS might initially sound like a hiker's dream come true, but the technology is not a quick fix and is only as good as its user. If your map-and-compass and navigation skills are lacking, GPS will not only not help you, it may get you into trouble by giving you the false confidence to head into uncharted territory.

GPS is (and always has been) meant to be used alongside the fail-proof ability to read maps, use a compass and grid system (latitude/longitude or Universal Transverse Mercator [UTMI]), and observe your surroundings.

GPS technology got its start in 1973 as a space-based navigation system operated by the U.S. Department of Defense (DOD). GPS is able to determine a hiker's position on the earth's surface by calculating the distance between you and signals from the 24 satellites that orbit the earth. To receive a two-dimensional map position fix (lat/long or UTM), you need to get a read from three satellites (four will determine elevation). From there, you need to be able to apply these coordinates to a map, use your compass to set and follow a bearing, and use your head to determine the most sensible route. GPS offers information in a straight line, which, if you're on, say, Mount Washington, could send you right over the edge of the Tuckerman Ravine headwall.

You also should know that the DOD has built in what's called Selective Availability, a process that varies signals. (You can get around Selective Availability, but it's not cheap, or always practical.) For horizontal readings, count on variations of roughly 50 to 300 feet. For elevation, GPS is even less accurate, which is not reassuring if you're socked in on a winter ridgeline.

But I was simply tramping the low-lands of the SOLO campus where I work, so why was I having such a difficult time? I puzzled a while longer. Seemed I was standing too near too many buildings or under too many trees--or both--to get my "position fix." I

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meandered around trying to find holes to the sky. Eventually, I had managed several sets of coordinates. I punched in coordinates to get me from "DECK" to "ORCHARD," and I got my bearing. It was time for my compass.

But I had run out of time. Seemed I should've spent the big bucks. You see, a unit that would've seen me through those pesky trees and other obstructions right now costs roughly $1,000. Of course, the technology is changing almost daily; it shouldn't take long for prices to fall. But if, like me, you're using one of the less expensive models (handhelds begin at just under $200; the model I used retails for $250), dense canopy, ridges, and valleys (read: Northeast), deep canyons, or tall buildings can keep you from being able to lock onto satellites or keep a position fix. It sometimes took me 20 minutes or more to lock on to the requisite three satellites while testing in New Hampshire's White Mountain National Forest, where vegetation is lush and dense. A map and compass were looking more and more like all I needed-- until I talked with Lieutenant Rick Estes, head of specialized search and rescue for New Hampshire Fish and Game. Estes swears by the $920 Brunton XLIOOO he uses in his search-and-rescue missions. When Estes sends out his rangers, they carry these high-end GPS units. By using them, says Estes, his rescuers know, almost beyond a shadow of a doubt, that they have searched every corner of an area. "It's nice to be able to tell the family with confidence that we have most assuredly covered that territory," he said. Learned well, GPS allows you to find your exact position on a map, can set and keep a bearing, tell you the distance you've traveled, how much farther you have to go, if you've lost your course, and how to get back on track.

Now I was getting somewhere, I was beginning tc understand the public's enthusiastic embrace of GPS According to the U.S. GPS Industry Council, globa consumer sales could exceed 8 billion by the yea 2000 and $16 billion by 2003. "I'd like to see th technology take off," Estes words echoed. At th Appalachian Trail Conference's recent annual meetin in western Maine, a GPS workshop I was intereste in had sold out--80 people! The next best seller ha only 20 participants. "I'd like to see the technolog take off," Estes words echoed. "Once you know hov to use GPS, you can turn it on, and within two or three minutes, know exactly where you are. It's good stuff."

Still, I can't help but feel a little nostalgic for the days when heading into the backcountry meant getting away from phones and computers and relying on such simple things as our smarts, a map, and a $15 compass. And Estes says he hasn't changed his mind about one thing: "GPS is not a magic wand. This kind of technology does give people a false sense of security. We've got to keep getting that message out."

U.S. Forest Service ranger Chris Joosen says he thinks that within the next few years GPS will be considered industry standard for outdoor professionals and guides, rangers, and search-and-rescue personnel. I guess my, and probably your, techno-phobe days are numbered.

*Editor's Note: This article first appeared in **AMC Outdoors** in October of 1997 and is reprinted by permission. Jeanne is a free-lance writer, SOLO Wilderness Medicine Instructor, and avid outdoorswoman.*

WHERE IN THE WORLD AM I?

A New Course from SOLO

Armed with compass, GPS, and cell phone, we strike off into the back-country secure in the knowledge that we are fully equipped to deal with an emergency.... but do we know how to use what we've brought and how to deal with the possibility that what we've brought might not work? This fast-paced, fun-filled, two-day workshop unlocks the mysteries of map and compass, GPS, and celestial navigation. Open to anyone, this course will provide those with emergency care training a chance to treat their patients and direct rescue operations-- if they can find their "Wounded Waldos" along the trail.

October 31- November 1 at SOLO in Conway, New Hampshire (603-447-67111)
April 17-18, 1999 at the Appalachian Mountain Club in Pinkham Notch, New Hampshire (603-466-2727).

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RETAINING AND MAINTAINING THE TRAINING...

Keeping Wilderness Medical Knowledge, Skills, and Certifications Current

By Holly A. Weber, (W)EMT-I/C

In the outdoor industry, emergency medical training has come a long way in just over two decades. Given that expeditions are routinely staffed with Wilderness EMTs, that trip leaders and guides are required to have Wilderness First Responder certification to lead programs of extended durations, and that even camps and outing clubs are investing in Wilderness First Aid courses, it is no surprise that backcountry medicine continues to be a hot topic of conversation. Nowadays, with the widespread availability of courses and the maturity of the "big three" wilderness training schools, the questions have changed from "Where do I find the training?" to "How do I keep my certification current?" So before you catch yourself in one of those, "oops, I forgot" situations, you might want to take a few notes.

Retaining Vs. Maintaining the Training

As with any certification, the challenge is two-fold: first, how to provide for the best retention of skills and knowledge, and second, how to keep the certification current. While the two challenges go hand-in-hand, it is often very easy to tip the balance by not having access to sick or injured parties or by disregarding the expiration date on the card. Well, here are a few tips to help the wilderness-trained and emergency medicine-minded folks survive outside of the wilderness zone.

Retaining: Skills & Knowledge Retention

The maxim "What I hear, I forget. What I see, I remember. What I do, I know" has been a mantra in the experientially-oriented outdoor industry for decades. When it comes to wilderness medicine, the chant is the same; although, unlike climbing ropes and hiking boots, there is not a plethora of sick and wounded folks just hanging out waiting for some action. Even in peak backcountry season, risk management programs have helped to reduce the number of casualties in the great outdoors. It is no surprise that schools like Stonehearth Open Learning Opportunities (SOLO) in Conway, New Hampshire; the Wilderness Medicine Institute (WMI) in Pitkin, Colorado; and the Wilderness Medical Associates (WMA) of Bryant Pond, Maine, field hundreds of questions on "staying sharp," "keeping the information fresh," and "how to use what I know so that I don't lose it."

First, keep in mind that wilderness medicine is medicine, which means there is a certain level of academic retention that is required. In order to keep up with the changes in medicine, you need to have access to them. SOLO and WMI encourage their students to subscribe to journals that provide sources of current information. The *Wilderness Medicine Newsletter* was designed to fulfill that very purpose. Beyond that, countless other magazines and publications provide sources of updated information and techniques such as the *Journal of Emergency Medical Services* and *Emergency Medical Services Magazine*. Both of these monthly magazines have continuing education review sections with quizzes that can be scored for credit. An outdoor magazine such as *Backpacker* has a regular column on backcountry medical concerns and treatments called "Body Language," and *Outside* posts regular dispatches of wilderness medical tips. Many membership organizations such as the National Ski Patrol and the Appalachian Mountain Club also feature great review articles for backcountry practitioners. Furthermore, most libraries subscribe to the true medical journals like *The New England Journal of Medicine* and *JAMA*. Periodicals are definitely a great place to start.

If the post office just won't deliver magazines and journals to the environs of your license plate, perhaps it is time to pick up a few good wilderness medical books for your personal library. Globe Pequot Publishers has recently unveiled *The Wilderness First Responder* by Buck Tilton and Frank Hubbell, DO. This book is a tremendous compilation of information from two of the guys who have made pre-hospital wilderness medicine what it is today. The National Outdoor Leadership School has also released a third edition of their popular *NOLS Wilderness First Aid* by Linda Lindsey and Tod Schimelpfenig. You can find pocket-sized first aid reference books in commercially-packaged first aid kits such as Tilton's

Backcountry First Aid and Extended Care in Atwater Carey's kits or Dr. Eric Weiss' *Wilderness and Travel Medicine* in his Adventure Medical Kits. These handy references can be carried just about anywhere for a quick review. The Wilderness Medical Associates have also published a pocket reference guide called *Wilderness Medical Associates' Field Guide* authored by James Morrissey. Of course, if you prefer a light and easy approach to wilderness medicine, my personal favorite is still *Medicine for the Backcountry* by Tilton and Hubbell.

For the adventure traveler who is always on the go, carrying around a library of reference books may not seem too appealing. Take heart-- there are other resources out there, many of which are more participative. Wilderness medicine conferences have been cropping up all over the country. The Wilderness Medical Society of Indianapolis, Indiana hosts at least three different wilderness medicine conferences and scientific assemblies each year. Located in choice recreational areas, these conferences generally provide a mix of hands-on workshops, lectures, and seminars. Other national conferences such as the Wilderness Risk Management Conference and the Association for Experiential Education's regional and national conferences offer wilderness medical workshops and pre-conference seminars. The more traditional rescue, disaster, and EMS conferences are also beginning to include a mix of urban and wilderness workshops. If you can't afford the travel and expense of these conferences, inquire about the possibility of bartering services. Many national conferences scramble for assistance with set-up and take-down activities ... if there's a will, there's a way!

Locked into an urban environment with no way out for part of the year? Worry not-- check out the events calendars at your local outdoor shops. It is not uncommon for stores like *Eastern Mountain Sports* or *REI* to host lectures on backcountry first aid. And if they don't, why not organize such an event yourself? Chances are, if there is one WFR or WEMT getting rusty, there's probably another not too far away. Other avenues to explore are the in-services held at local hospitals, community centers, ski patrols, search and rescue teams, fire departments, and rescue squads. And while you're there, why not explore the possibility of volunteering or observing?

The more Americans head outdoors, the more opportunities there are for volunteering. Events are being hosted across the country for just about every sport out there. Where there are people and competitions, there are, unfortunately, accidents and injuries. Whether it is the *Climb to the Clouds* on Mount Washington, the Boston Marathon, or a local walk-a-thon, most events need volunteers to staff first aid tents or comfort centers. Check with area Chambers of Commerce to get an idea of what's going on around you and take the opportunity to get involved. Each experience will provide hands-on training of a unique kind.

Volunteerism can be a very gratifying way to keep wilderness medical skills sharp. Many non-traditional health care groups seek willing individuals to travel to developing countries and help provide services. Groups like *GeoMed* and *Doctors Without Borders* are just a couple. Sometimes, though, you don't have to go too far from home. Urban free clinics and city shelters often could use the extra hand as well.

If you can't get your hands on live patients, there is always the option of taking more classes and being exposed to more simulations and scenarios. Each of the schools mentioned earlier hosts a variety of programs, workshops, and seminars throughout the year and across the country. A formalized review session often does wonders in boosting confidence levels. If all else fails, get a group of your hiking or paddling cronies together and set up your own first aid scenarios-- a little imagination goes a long way!

Maintaining: Keeping Certifications Current

While many of us find exercising our minds very easy, getting off our duffs to file paperwork isn't as effortless. Although it may seem complicated, keeping a certification current is generally an easier route than dealing with a lapsed certification. However, that may require a bit of discipline. In most cases certifications are granted for two years, but regardless of the time frame, the date of expiration is the date of expiration. Most employers can't turn in copies of expired cards to their insurance companies

or their accreditation boards. If the card is about to run out, contact the issuer right away. In many cases issuing organizations can grant an extension to get you through to the next recertification class. (But remember Visa can't increase the limit of your American Express card, so start at your training source.) Keep in mind that at the Wilderness First Responder and Wilderness EMT levels, the *de facto* standard certifications require a current CPR Healthcare Provider (American Heart Association-- a two-year card) or CPR for the Professional Rescuer (American Red Cross-- a one-year card) card to be considered valid. Generally, the two certifications expire on the same date. ALERT: some states still have not approved the two-year CPR certification, so pay close attention.

While Wilderness First Aid card holders have the most straight-forward recertification process--retaking the course, WEMT card holders have a more complicated process. WEMTs must hold current state or national EMT certification, which means two separate sets of recertification challenges (one for the EMT and one for the "W") and are generally required to track their continuing education hours. Wilderness First Responders usually have to successfully complete a two-day review program but are not *required* to show verification of their continuing education hours. Individuals holding specialty certifications like the National Ski Patrol's Outdoor Emergency Care card have yet another set of requirements. Regardless of the certification, it makes sense to be proactive: Call for program listings and ask questions before the cards expire. Stash a journal of activities in a safe place with your certification cards (keep laminated photocopies in your wallet when you travel to work or expedition to Katmandu.) File for extension in advance if traveling out of the country for long periods or if illness and/or injury will prevent you from completing the recertification process before the date of expiration.

Proper Prior Planning...

Regardless of the path you travel, keeping current with information, skills, and certifications, comes down to advance planning. By keeping aware of the resources around you and abreast of the policies governing your standard of care, you will be better able to prevent those "uh-oh" situations. When in doubt of what to do, pick up the phone and make a few calls. A list of numbers are listed below to help you get started!

Contact Numbers

Adventure Medical Kits - 800-324-3517
Appalachian Mountain Club - 617-523-0655
Association for Experiential Education (AEE) - 303-440-8844
Atwater Carey First Aid Kits - 800-359-1646
Backpacker Magazine - 800-666-3434
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From the Doctor's Corner....

A Few Words of Wisdom on TRENCH FOOT/IMMERSION FOOT

By Frank Hubbell, DO
Reviewed by Murray Hamlet, DVM
Natick Cold Weather Laboratories

Trench foot or immersion foot is a non-freezing cold injury. Considered non-freezing because the extremity does not have to be exposed to temperatures below freezing, the injury is caused by prolonged vasoconstriction of the capillary circulation in the skin. This normal response to cold exposure is a protective mechanism to assure that we do not lose excessive amounts of heat through our skin. However, our skin requires blood

flow and oxygen just like any other organ in our body. If deprived of vital oxygen for too long, the skin will die. Skin can tolerate this ischemic event for approximately six hours. If the vasoconstriction lasts longer, the injury pattern of immersion foot begins to appear.

Cold alone will rarely cause immersion foot; the area also has to be wet which is why this injury is typically seen in individuals that allowed their feet to remain wet and cold for extended amounts of time (usually greater than twelve hours).

Incidence of immersion foot is not confined to subtropical or tropical areas. Water in which people paddle, wade, etc. is normally below skin temperature. The warmer the water, the longer the delay of onset. The development of immersion foot creates a favorable medium for growth of athlete's foot.

PREVENTION:

Know, teach, and perform proper foot care. During the span of a day's physical activity, feet typically become damp with sweat. At the end of the day, the feet need to be stripped down, inspected, dried, and possibly massaged.

Throughout the night the feet need to be kept dry and warm. NEVER ALLOW ANYONE TO SLEEP WITH WET OR EVEN DAMP FEET. Use of antiperspirants (not deodorants) several times a day for two weeks before a trip can help minimize sweating.

RECOGNITION:

Immersion foot injury is recognized as the extremity is warmed and the circulation returns to the skin. At that time there will be significant pain response and the area will become hyperemic or red due to the dramatic increase in circulation. Over a period of hours, the extremity will begin to swell; this swelling can be quite impressive with extension up to the knee.

IMMERSION FOOT FIELD TREATMENT:

Please Note: Treatment may not be effective. There may be long-term residual effects, so prevention is critical.

- Dry the feet and keep them warm and dry.
- Control the inflammatory response with any non-steroidal anti-inflammatory drug, such as aspirin, ibuprofen, Motrin, Aleve, etc. This will have to be continued throughout the evacuation process and for several weeks afterward.
- Help to minimize swelling by elevation and massage of the feet..
- Provide pain control which may require a strong narcotic.
- Prevent a secondary skin infection by keeping the area clean and using a an oral antibiotic, preferably Cephalexin 250mg every 8 hours for 7- 10 days.
- Prevent re-exposure to cold and moisture.
- Evacuate-- this injury has to be evacuated for long-term therapy. If they can tolerate the pain, they can walk out.
- DSMO may be used in the early stages to control the severe inflammatory response.

WILDERNESS MEDICAL SOCIETY's Curriculum Committee Update on the WILDERNESS FIRST RESPONDER

By Linda Lindsay, RN, Committee Chair

The Wilderness Curriculum Committee of the Wilderness Medical Society was established just over a year ago with the purpose of designing and presenting to the Board of Directors of the Wilderness Medical Society an outline of recommended course topics for a Wilderness First Responder (WFR) course. This list of course topics is not intended to be used as a course curriculum or outline, but rather, the recommended content for a WFR course as determined by the Wilderness Medical Society.

Early this spring the Wilderness Curriculum Committee, consisting of Bill Aughton, Nancy Doherty, Melissa Gray, Frank Hubbell, Dennis Kerrigan, Paul Marcolini, and myself, met and hammered out a first draft. At the beginning of October, after a series of revisions and comments by the committee, a final draft was put forth to the WMS Board of Directors along with many providers and consumers of wilderness medical education for an assessment of the support for the document. The final document will be available through the WMS at the end of November. You can contact the Wilderness Medical Society at its new office located at 3597 East Fountain Boulevard, Suite A1, Colorado Springs, Colorado 80910.

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THE OUTDOOR NETWORK IS UNDER NEW OWNERSHIP!

The *Outdoor Network* has a new owner! Announced at the third annual Outdoor Industry Party last week in Boulder, CO, Mikal Evan Belicove has assumed ownership of *The Outdoor Network* newsletter and website. This change is the result of a six-month working relationship with Josh Bernstein, *The Outdoor Network's* former owner.

"Mikal has done a tremendous job as Editor-in-Chief of our newsletter, and I'm sure that his efforts as Publisher will be equally successful." said Bernstein. "*The Outdoor Network's* efforts to continue serving as a global forum for outdoor professionals couldn't be in better hands."

Belicove began his involvement with *The Outdoor Network* as an Editorial Review Board member in 1995 while he was with the Association for Experiential Education as Director of Membership Services and Conferences. Belicove left AEE in early 1997 for the Executive Director position at Adventure Travel Business Trade Association (ATBTA) in Englewood, CO. That position dissolved after a year while ATBTA went through restructuring. His position with *The Outdoor Network* came only a few weeks after leaving ATBTA.

"These past six months have given me a great opportunity to work on a publication that I have a real passion for," said Belicove. "Although I look forward to the challenges ownership brings, I don't expect there to be many changes right away to our newsletter or web site. My focus will be to broaden our exposure and see if new relationships and affiliations can make our efforts even more effective at informing a diverse outdoor industry."

Although the details of the change in ownership were not disclosed, on October 15, 1998, Unified Communications, LLC, acquired specific assets of Desert Pine Communications, Inc., the parent company of *The Outdoor Network*. The change should be seamless and subscriptions will remain unchanged.

Since 1989, *The Outdoor Network* has provided outdoor leaders with an unbiased forum for the advancement and long term stability of the outdoor education and outdoor recreations industries worldwide. *The Outdoor Network* is the Global Forum for Outdoor Professionals.

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Wilderness Medicine Newsletter
FOR THE RECOGNITION, TREATMENT, AND PREVENTION OF WILDERNESS EMERGENCIES

NOVEMBER/DECEMBER 1998 ISSN-1059-6518 VOLUME 9, NUMBER 6

GENDER SPECIFIC EMERGENCIES

You crawl into the tent of a fourteen-year-old client, a young woman who sent her tentmate to get you. "Her vagina hurts," explained the tentmate, "but she was too embarrassed to tell you." The client, now your patient, sits up at your arrival. Your first impression is positive: The young woman appears strong and healthy. But in response to your questions she says, "It's sore and it itches, and it burns when I pee. I'm getting scared."

By Shana Tarter, W-EMT

Injuries or illnesses involving the genitalia of your clients can be embarrassing, you bet, and frightening and, from time to time, even life-threatening. These emergencies range from simple urinary tract infections that can be treated in the field to testicular torsion that results in the loss of a testicle to ruptured ectopic pregnancies with fatal internal blood loss. These problems have occurred on outdoor trips. You, the trip leader, should be able to assess, treat, and decide when to evacuate a client with injured or ill genitalia.

Both you and the client will appreciate a private place to talk. The client will benefit if you can maintain eye contact while being straightforward, respectful, and non-judgmental. Use proper medical terminology and/or terms that you both understand. Avoid jokes or slang. A member of the client's sex should be present before and during any physical exam--especially where minors are involved--unless it is impossible.

MALE-SPECIFIC EMERGENCIES

Inguinal Hernia

Inguinal hernias are possible in women but far more common in men. An inguinal hernia occurs when part of the intestine protrudes into the groin or scrotum. Weak abdominal muscles due to congenital malformations, trauma, aging, or any activity that increases intra-abdominal pressure such as coughing, straining, lifting, or vigorous exertion may cause a hernia.

The client will complain of a lump or swelling in the groin and a sharp, steady pain. If the hernia becomes incarcerated--stuck in the wrong place--the intestine may become blocked. The portion may then become strangulated, the blood supply cut off, with death of the bowel resulting. If the intestine is blocked, the lump in the groin will become more swollen and more tender. The client may vomit and complain of wave-like abdominal cramps. The abdomen will become swollen, and the client will not have any stools. If you monitor bowel sounds by periodically placing your ear on the abdomen, you will hear an increase in bowel sounds, then a decrease, and finally an absence of bowel sounds.

Attempt to reduce the hernia by lying the client on his back with the head and chest lower than the abdomen. Apply moderate, steady, upward pressure on the hernia to reduce it. It may take 10 minutes or longer to reduce the hernia. Monitor the client for the next 24 hours for signs of intestinal obstruction.

If you are unable to reduce the hernia or if the hernia reappears after reduction, the client will need to be evacuated. If signs and symptoms of intestinal blockage or strangulation are present, evacuate the client immediately. Do not give the client anything to eat or drink unless dehydration becomes a problem during a long evacuation, in which case small amounts of water at regular intervals may be given.

KC 021769

Torsion of the Testis

Torsion of the testis is a twisting of the testis within the scrotum. Mechanisms for testicular torsion could be as dramatic as violent physical activity or as simple as rolling over in a sleeping bag. Blood vessels become twisted, decreasing the blood supply to the testis. If the blood supply is totally cut off, the testis dies. After 24 hours without blood supply, little hope of saving the testicle remains.

With many clients, the scrotum is suddenly and intensely full of pain, sometimes rendering the person unable to move. The scrotum grows red and swollen, and the testis may appear slightly elevated on the affected side. The pain, however, can come on slowly, and the other "classic" signs and symptoms may be absent.

Cool compresses and pain medication will provide some relief. An improvised "jock strap," made, for example, from a triangular bandage, will elevate the scrotum and may increase blood flow to the testis. The client who is unable to walk must be evacuated for treatment immediately.

If evacuation will be delayed, you may choose to attempt to rotate the affected testicle back into position. Since most testicles rotate "inward," a gentle rotation "outward" may give immediate and blessed relief. The client may wish to make the rotation himself. If it doesn't work, perhaps the testicle rotated in the opposite direction, so rotate the testicle two turns in the opposite direction. If you fail, the client is no worse off than before the attempt was made. In either case, the client suspected of suffering torsion of the testis should be evacuated as soon as possible.

Epididymitis

Epididymitis is an inflammation of the epididymis, a problem that can be caused by gonorrhea, syphilis, tuberculosis, mumps, prostatitis (inflammation of the prostate), or urethritis (inflammation of the urethra). Epididymitis is not caused by traumatic injury to the scrotum.

The client suffers from pain in the scrotum, possibly accompanied by fever. The scrotum may be red and swollen. Epididymitis tends to come on slowly, perhaps over several days, unlike torsion of the testis which sometimes comes on rapidly (see below).

The treatment is bedrest--or bagrest--and support of the scrotum with a jock strap or whatever can be improvised to create support for the testicles. A non-steroidal anti-inflammatory drug (NSAID) such as ibuprofen may decrease the fever and pain. It is very difficult to differentiate epididymitis from torsion of the testis. Antibiotics are necessary, so the client must be evacuated when epididymitis is a possibility.

FEMALE-SPECIFIC EMERGENCIES

Mittelschmerz

Some women experience cramping in the lower abdomen on the right or left side or in the back during the middle of the menstrual cycle when the ovary releases an egg. The pain is sometimes accompanied by bloody vaginal discharge. This is called mittelschmerz from the German mittel for "middle" and schmerz for "pain."

The pain may be sudden, sharp, and severe enough to be confused with appendicitis or ectopic pregnancy. Ask the client where she is in her menstrual cycle. Has she ever had this pain before? Typically, a woman will have had similar cramping in the past. Any light bleeding or pain should cease within 36 hours. The patient exam will reveal that her abdomen is soft. Women taking birth control pills do not ovulate, so they cannot have mittelschmerz.

Managing the symptoms with over-the-counter pain medications and general support of the client is all that is usually required unless there is reason to suspect ectopic pregnancy. Monitor the client closely for signs of another serious abdominal emergency.

Dysmenorrhea

Dysmenorrhea is pain in association with menstruation. Possible causes include prostaglandins, which cause the uterus to cramp; endometritis, inflammation of the endometrium; pelvic inflammatory disease; or anatomic anomalies such as a displaced uterus.

Drugs such as ibuprofen reduce the pain as well as the volume of flow and the length of the period. Relaxation exercises such as yoga and massaging the lower back or abdomen help reduce the pain. Applying heat to the abdomen or lower back may also help lessen the pain. A change in diet may help. Decreasing the amount of salt, caffeine, and alcohol in the diet while increasing the B vitamins--especially B6, found in brewers yeast, peanuts, rice, sunflower seeds, and whole grains--can offer some relief during the acute phase of the cramps. Because exercise causes endorphins (natural opiates) to be released by the brain, many women find that cramps diminish when they participate in strenuous exercise.

Secondary Amenorrhea

Secondary amenorrhea is the absence of menstrual periods after a woman has had at least one period. Causes of secondary amenorrhea include pregnancy, ovarian tumors, intense athletic training, altitude, and stress (physical and emotional). In the past it was thought that excessive weight loss in female athletes, resulting in low body fat, was the cause of amenorrhea. It is now believed that stress (physical and emotional) may cause hormonal changes resulting in amenorrhea. Changes in the menstrual cycle are common on outdoor expeditions and may be normal adjustments to unfamiliar stresses.

Vaginal Infections

The normal pH of the vagina is slightly acidic. An alteration in the pH may cause a vaginal infection to develop. Infections usually result from lowered body resistance due to stress (physical and emotional), a diet high in sugar, or the use of birth control pills and/or antibiotics. A diabetic or prediabetic condition also increases the risk of infection. Cuts and abrasions from intercourse or tampons, not cleaning the perineal area (the area between the vagina and anus), or not changing underwear can lead to an infection.

There are three major types of vaginal infections: yeast (fungus), bacterial vaginosis (bacteria), and Trichomonas (a parasitic protozoan). For the purposes of field diagnosis, the symptoms are similar, and initial treatment is the same.

Signals of vaginal infection include excessive or malodorous discharge from the vagina with redness, soreness, or itching in the vaginal area. There may also be a burning sensation during urination.

Treatment should restore the acidity of the vagina. One approach is for the client to douche with plain disinfected water or a solution of one to two tablespoons of vinegar in a liter of warm disinfected water. Vaginal douches can also be made from povidone-iodine (two tablespoons of 10 percent povidone-iodine per liter of water) or Zepharin chloride (1:1000 to 1:5000 strength). In the field, douching is accomplished by pouring the solution into the vagina while the client lies on her back with hips elevated. This process may require two people. Ideally the client should douche in the morning and evening at the onset of infection.

Women with a history of vaginal yeast infections may want to take an over-the-counter medication, e.g., Gyne-Lotrimin® or Monistat 7® with them on extended expeditions. These are the most common medications used to treat yeast infections. Women with bacterial vaginosis or Trichomonas will require antibiotic treatment, which means they must be evacuated. Acetaminophen and warm, moist compresses should provide symptomatic relief from the pain. Itching, which may be severe, often responds to cool compresses and over-the-counter 0.5 percent hydrocortisone cream, e.g., CortAid®. If these treatments don't provide relief within 48 hours, the client should be evacuated. An untreated infection can develop into a more serious infection of the reproductive system.

Recommendations for a Wilderness Medical Kit to Manage Gender Specific Emergencies:

Over-the-Counter Medications

- Ibuprofen or other NSAID for pain and swelling
- Vinegar, povidone-iodine, or Zepharin chloride for douching
- Anti-fungal medication e.g., Gyne-Lotrimin® or Monistat 7® for vaginitis
- 0.5 percent hydrocortisone cream, e.g., CortAid® for itching from a vaginal infection
- Pyridium® for the burning associated with a UTI

Prescription Antibiotics

- Keflex® for epididymitis
- Bactrim® for UTIs

The best prevention for vaginal infections is education. To help prevent vaginal infections, women should take care 1) to clean the perineal area with plain water or a mild soap daily and to 2) wear cotton underpants and loose outer pants. Unlike cotton, nylon doesn't allow air to circulate, thus giving bacteria a moist place to grow. Women prone to vaginal infections should avoid coffee, alcohol, and sugar, which can change the pH of the vagina.

Urinary Tract Infection

Urinary tract infections (UTIs) are relatively rare in men but common in women due to the relatively short length of the urethra through which problem-causing germs are introduced. The infection can affect the urethra, bladder, ureters, even the kidneys.

Urinary tract infections cause increased frequency or urgency of urination with decreased urine output and/or a burning sensation during urination. The client usually complains of pain above the pubic bone and a heavy urine odor with the morning urination. Blood and/or pus may be present in the urine. Urinary tract infections can progress

to kidney infections. If the kidneys are infected, the client usually complains of pain in the small of the back where the ribs join the backbone, and tenderness when that area is palpated. The client may have a fever.

The best treatment for a UTI is antibiotics. Have the client drink lots of water every day and empty the bladder often. A client with a UTI should get as much rest as possible. The perineal area should be cleaned with water or mild soap daily. Eating cranberries, plums, and prunes makes the urine slightly acidic, which improves the effectiveness of antibiotic therapy.

On extended expeditions, consider carrying antibiotics, such as Bactrim® or Keflex® to treat urinary tract infections. Consult your physician for antibiotic specifics. Pyridium®, available over the counter, will help relieve the pain of urination, and should also be considered for first aid kits on extended outdoor trips. UTIs can be managed in the outdoors, but not kidney infections--therefore, if an infection persists for more than 48 hours despite the use of antibiotics, the client should be evacuated.

More Serious Conditions

Other more serious conditions can occur on outdoor expeditions including pelvic inflammatory disease, toxic shock syndrome, and a ruptured ectopic pregnancy. All of these conditions require relatively rapid evacuation to definitive medical care. While specific diagnosis in the field is challenging, the outdoor care provider should recognize serious signs and symptoms. It is recommended that you evacuate any woman who demonstrates: a high fever (>102 F), abdominal pain that persists for greater than 24 hours or that had a sudden onset and is sharp or localized, signs and symptoms of shock, vaginal bleeding not associated with a regular menstrual period, and any woman who has abdominal pain and who might possibly be pregnant.

The Wilderness Medicine Newsletter is intended as an informational resource only. Neither the WMN or its staff can be held liable for the practical application of any of the ideas found herein. The staff encourages all readers to acquire as much certified training as possible and to consult their physicians for medical advice on personal health matters.

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A SPORT FOR THE SEASON

Rebecca S. Newton, W-EMT

Featured in this Issue:
BACKCOUNTRY SKIING

Backcountry skiing is one of the gifts of winter. Those who dread the season's snow may never understand the lure of this powerful and graceful sport, but its followers are passionate and continually growing in number. While skiers suffer many injuries on the slopes each year, skiing causes few fatalities.

Many of the problems suffered by skiers are fairly mild and fall into two general categories. The first is a group of problems that tend to be caused by environmental conditions, particularly by danger factors heightened by winter weather, and include hypothermia, localized cold and moisture injuries (frostbite, blisters, and trenchfoot), and avalanche. These problems have warning signs or relatively gradual onset and can be addressed with issues of whole-body care and awareness of one's surroundings.

The second group includes more severe ailments, such as sprains and dislocations at the joints and fractures of the long bones. These problems are generally acute injuries caused by isolated traumatic incidents. The risk of such an injury can be decreased by awareness and caution, but these are accidents that are often unpredictable and sometimes a simple matter of bad luck. It is crucial that anyone who spends a good deal of time in the winter backcountry understand the risks of and treatments for these various problems. Just as necessary is the ability to deal with these problems with competence and sound judgement and to know when to seek outside help.

ENVIRONMENTAL PROBLEMS

HYPOTHERMIA

One of the most common of all backcountry maladies, particularly in winter, is hypothermia. As a backcountry skier, you are likely to spend your days going through mixed periods of strenuous exertion, climbing with skins or sidestepping a steep slope, and controlled downhill maneuvers. You'll often take up the trail in the morning, as the air is warming and you're still powered by a hearty breakfast. As you ski throughout the day, your energy levels dwindle. By afternoon, your clothes may be damp from the day's perspiration. The air chills quickly once the sun gets below the horizon--and sunset comes earlier than expected deep in mountain valleys.

To prevent hypothermia from becoming a problem on your trips, be self-aware. Stay well-hydrated, as dehydration is the root of so many backcountry troubles. If you're on an extended trip (or if you're headed into isolated terrain where an accident could extend your trip unexpectedly), have a means of melting snow to make more water. Prevent your bottles from freezing shut; dry the threads after drinking, use wide-mouthed bottles, and make sure the bottles are sturdy enough not to crack in the cold weather. Keep one bottle insulated inside your pack to prevent freezing and another readily accessible so that you don't need to take off your pack each time you'd like a drink. You'll be more inclined to stay hydrated if getting a drink is less of a hassle.

The same general rule goes for food: snack often, and keep it simple. It's easy to cool off quickly when taking a long break, so try to bring along high-energy foods that can be carried in your pockets and consumed while standing--chocolate, dried fruit, energy bars, bagels. If you do need to make a longer stop (to prepare a bigger meal or to tend to an injury or an equipment problem), be sure to put on more layers as soon as you stop--before you begin to cool off. Be sure that all of your backcountry gear--but particularly any that will be in direct contact with your skin--is made of quick-drying synthetics, and always carry a spare dry layer (e.g., an extra thermal top and bottom, pair of mittens, and set of socks) for emergencies and for late-afternoon chills.

LOCALIZED COLD INJURIES

Frostbite is a related problem often encountered on backcountry winter trips. Though affecting localized tissue in exposed body parts, it can be addressed, to some degree, as a whole-body problem. Prevention of frostbite, like that of hypothermia, necessitates awareness of your environment and your comfort level and attention to such factors as being rested, well-hydrated, and well-nourished. Since peripheral vasoconstriction caused by hypothermia can precipitate frostbite, minor problems can usually be prevented by taking care of these needs and by being careful to keep extremities protected from the cold. Keeping the head warm with a good hat goes a long way toward keeping the whole body warm.

Fingers and toes are among the body parts most commonly threatened by frostbite. Mittens and gloves are essential to keep hands warm, as are waterproof overmitts if you expect to be handling snow (to build night-time shelter, for example). Mittens keep hands warmer than gloves, since the fingers can pass warmth to each other. Gloves, however, allow much more dexterity. The sacrifice in warmth is often worth the usefulness gained by the wearer in the ability to pitch a tent, to rig a binding, to unzip a backpack. In sum, mittens are generally warmer, but it's better to wear gloves if choosing mittens means that you'll be removing them frequently to tend to some task.

Areas of the head and face are also at high risk. Particularly common sites for frostbite injury include the nose, cheeks, chin, and ears. Protection with scarves, hats, neck gaiters, and face masks can help to spare them. At extremely low temperatures, flesh can freeze almost instantly upon exposure to air and wind. At less severe temperatures, however, frostbite's onset may be more gradual and less obvious.

Minor frostbite can be treated in the field. If the injury is still soft--and is numb, cold, and pale but not white--it is safe to field-rewarm using skin-to-skin contact. Never massage the area, rub with snow, or use an external source of heat. If a blister or bleb forms, protect it and evacuate the patient. This signals a more serious condition and an injury that may be painful when thawed. Never attempt to field-warm a body part that is white and hardened. Once thawed, this area will be excruciatingly painful and utterly useless. Evacuate this patient immediately.

Do not thaw any frozen part, no matter how minor the injury, that you cannot keep thawed, as each refreezing magnifies tissue damage and the threat of possible amputation. To help prevent frostbite, be sure that boots, clothing, and crampons fit well without being too tight, and avoid alcohol and tobacco, which cause vasoconstriction.

Keeping feet dry and comfortable with well-fitting boots and wicking socks will also help to prevent blisters, that most insidious of common saboteurs, and trenchfoot, a more serious ailment. (For detailed discussion of blister prevention and treatment, see the upcoming trail running article in this column in our January/February 1999 issue.) Trenchfoot, a nonfreezing cold injury, is caused by a continual dampness that leads to vasoconstriction and an inadequate blood supply. Untreated, it can lead to gangrene or nerve damage. Trenchfoot can be prevented by keeping feet dry, by changing socks regularly, and by never sleeping in wet socks at night.

AVALANCHE & FALLING SNOW

Avalanche safety, though beyond the scope of this article, is an important consideration to be factored into

backcountry plans. (For more information about avalanche safety, read "Avalanche Awareness" by Chris Joosen in the *Wilderness Medicine Newsletter* January/February 1998 issue.) If you're in avalanche country, it's a good idea to carry a beacon and to know how to use it. Still, remember that a beacon can't dig you out. As always, your best defense is good decision-making. It's safer to ski with others, but companionship may provide a false sense of security in the backcountry. Never ski a trail that you wouldn't ski alone. Also, remember to choose your campsite carefully, considering potential avalanche paths and searching overhead for dead or snow-loaded branches in trees that could collapse and cause injury in the night. Consult your local ski patrol, sporting-goods stores, parks service, or wilderness medicine institution for more information on avalanche safety training and always check the conditions with local backcountry personnel before heading out.

ACUTE TRAUMA

INJURIES OF THE JOINTS & BONES

It's easy to fall while skiing and to tweak an ankle or a wrist. Ankle injury is of particular concern for those wearing flexible boots and skis that don't detach from the boot during a fall (as is true of many cross-country and telemark models, particularly older-style ones). For equipment that does employ a quick-detach mechanism, it is important to have the apparatus set at the appropriate level for one's weight and skill level. Wrists, similarly, can get tangled up in pole grips and can be twisted uncomfortably. Learning how to fall comfortably and practicing safe falls can help prevent such injuries.

For minor sprains, use your judgement as you would in any backcountry injury situation. Rest, ice, compression, and elevation (RICE) is still the treatment sequence of choice. The snow itself provides an excellent cooling source. Fill a plastic bag with snow and wrap it in cloth. Never apply ice directly to exposed skin, for fear of causing frostbite, and take care to avoid getting the patient's clothes wet with melting snow. Compression can be achieved with an Ace bandage, first-aid gauze and tape, or other fabric wrap. A well-fitting ski boot in itself serves as a good compression device, as long as it does not sacrifice circulation. Keep in mind that if your patient is going to be involved in self-rescue (that is, if she's going to ski out on her own) she's got to have that boot on her foot. It may be best to replace the boot quickly after your evaluation, before swelling makes slipping it back on too painful.

Elevation and rest are more subject to judgement in the winter backcountry. If you have the supplies, the fortunate weather, and the inclination to stop for a few days to allow some healing before continuing out of the woods, you can consider that option. Most of the time, you will not be so lucky as to have enough food and other supplies to do this--particularly if your outing was intended as a day-trip--and, furthermore, you may want to leave before swelling incapacitates your patient. Non-steroidal anti-inflammatory drugs (NSAIDs such as Advil, Alleve) will decrease swelling and pain, but always be sure to check whether the patient has allergies before offering medications, and do not take the risk if his past medical history even hints at a possible adverse reaction to the pain killer that you have available.

More severe injuries that can occur in the backcountry include debilitating knee sprains, long bone fractures, and dislocations at various joints. Any injury this drastic, obviously, will necessitate a rescue, and it is unlikely that the patient will be able to help you. Stabilize the injury to the best of your ability and get the patient to definitive care.

EVALUATION, RESCUE, AND REST

If someone is injured on your backcountry skiing trip, the most important evaluation that you need to undertake--once you've made your patient as safe and comfortable as possible--is whether the injured person will be able to travel out of the backcountry under his own power.

Your usual options of self-rescue and outside assistance apply. Keep in mind, though, in winter conditions, that the snow may be used to your advantage to sled a patient out if you have the tools to rig such a device and the skill to control it on the trip out of the woods. On the other hand, if you decide that you can't succeed at rescue on your own, the unpredictability of winter weather may hinder your efforts, delaying rescue for several days if you're deep into the backcountry. Be sure that you are prepared to keep your patient safe and warm for as long as it may take the rescue group to find you, and use this judgement in evaluating your best course of action. As the trip leader, you must balance the well-being of the injured person with that of the rest of your party in making a decision about how and when to head out of the woods.

In the winter backcountry, the tools that you have at your disposal and the restrictions imposed on you by the weather may differ from those of more temperate times of year. But the underlying strategy for having a safe and

enjoyable trip is the same: keep both your judgement and your awareness of yourself and your surroundings sharp and focused. The best way to succeed in doing this is to avoid getting too run-down. Eat well, drink more water than you think you need, and respect your limits. The temptation of a great day in the backcountry is to linger in the woods for as long as possible, even as the sky darkens and the muscles tire--and every skier has felt that urge.

Resist it. Think of how good the contented soreness of a hard day's exertion feels when you stop for the night. Come in from the cold before you get hurt. Whether that means escaping to a luxurious lodge with down comforters and a cappuccino bar or snuggling into a cramped tent with a cozy sleeping bag and hot chocolate from a camp stove, you can relive the highlights of the day while you warm your feet and plan your next adventure.

New Dosage for Potable Aqua Water Purification Tabs

An Update from Wisconsin Pharmacal

Jackson, WI - Potable Aqua emergency drinking water germicidal tablets have been the easiest and most inexpensive means to treating questionable drinking water. With the introduction of new instructions, Potable Aqua has become even easier and more convenient to its users.

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*For more information about WMI check out our web site at **www.wildernessmed.com.***

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